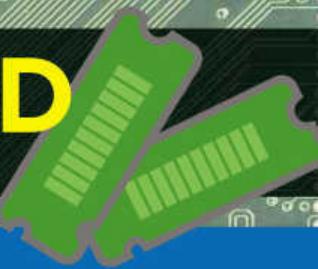


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08 Ultra HD Blu-ray
With services like Netflix growing bigger and bigger all the time, you might well think that the future of disc-based media is bleak. Apparently, though, there's still some money to be made in selling hard copies. That's why a new higher-definition version of Blu-ray is on its way, promising an even greater amount of storage space per disc. David Crookes looks at what's going on, when we can expect this new medium and considers its chances of success

18 Reasons To Upgrade To Windows 10

Last time around, Mark Pickavance provided some justifications for rejecting Microsoft's offer of a free OS and sticking with Windows 7. This week, though, it's time to play the devil's advocate, and put forward the argument for upgrading. So what reasons are there to start using Windows 10, will they be enough to convince you to take the leap?

28 Offline Gaming

Ever since home internet connections became commonplace, the world of online gaming has flourished, becoming an unstoppable, cash-generating beast. Games like *Call of Duty*, *Battlefield*, *World Of Warcraft* and many more all off players the chance of squaring off against other people around the world. But what about those of us who prefer our PC gaming to be done alone, without having to go online? Has offline single-player gaming dying out?

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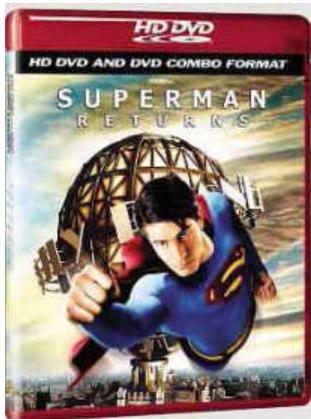
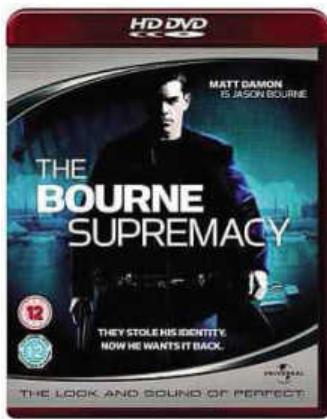
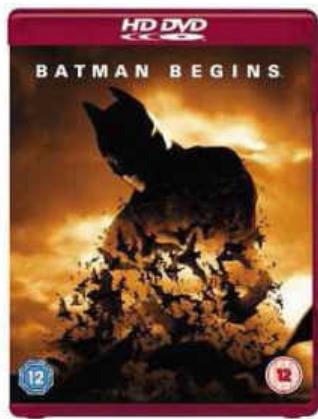
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Ultra HD Blu-ray: The Last Format?

CES saw the announcement of new Ultra HD Blu-ray players, while studios are lining up to release movies on the format. But, **David Crookes** asks, is this the peak for optical media?



Whether you're watching *The Man in the High Castle* on Amazon Prime Instant Video or catching up with *Orange is the New Black* on Netflix, one thing's for sure: there's no physical disc in sight. But this, as we're often told, is the future. Netflix not only has an impressive 33.3 million subscribers, it's growing fast, month by month, doubling its stock price in 2015 thanks to a push towards increased original programming. The simplicity of having thousands and thousands of titles at your fingertips without the need to move off the sofa and mess around inserting media is proving to be a major draw.

‘There is no competing technology this time around’

Even so, it hasn't stopped the advance of physical media. Although some formats may have gone by the wayside in recent months (Sony said goodbye to Betamax tapes in November 2015 – yes, just a couple of months ago), new formats are coming in. Sony is saying a big fat hello to one of them with the introduction of Ultra HD Blu-ray, which coincides, as it happens, with the rollout of the Ultra HD televisions. For a consumer base that has already moved from widescreen to HD-ready, it's presenting yet another way to catch up with our favourite programmes and movies. The only difference is that it may well be the very last new format we ever see.

Over the last few weeks, we've seen a number of manufacturers announce that they're going to be bringing Ultra HD Blu-ray players to the market. At the CES earlier this



How Blu-ray Works

DVDs reads discs using a red beam, while Blu-ray uses a blue laser, which allows it to read data from a disc using a shorter wavelength than DVD. Because Blu-ray players place the laser closer to the disc surface, only a very small area of the disc can be written to and read from, thus squeezing in 25GB per single data layer of a Blu-ray or 50GB per disc.

How Ultra HD Blu-ray works

Ultra HD Blu-ray works in the same way as Blu-ray, with the blue laser reading data. But this time, an even smaller part of the disc is being read from, so instead of squeezing in 25GB per layer, 33GB is possible. With three layers rather than the two of Blu-ray, it is possible to store 100GB of data per disc.

month, Panasonic presented its first offering, having previewed it a year ago, while Samsung announced the pricing of its UBD-K8500 player, for which it's taking pre-orders on its website for \$399 and which is set to be shipped in March. As the year goes on, we'll see more and more of these being shipped, and the prices will start to fall. We may have only just taken down the festive decorations but come the next time we put them up, these players could well be sitting under a fair few trees.

As it stands, this technology appears to be needed. Without ways to watch Ultra HD content, the numerous Ultra HD televisions that are being sold are only fulfilling a fraction of their duties. Ultra HD Blu-ray is also a good technology and it even has a snazzy logo (always a good moment and talking



Do You Remember HD-DVD?

Whenever new standards emerge, wars tend to rage. We witnessed it between VHS and Betamax, and we saw it just as starkly when the HD-DVD and Blu-ray formats emerged at the start of the 21st century. In fact, by the time Blu-ray and HD-DVD players were hitting the shops in 2006, there were more than a few punches thrown between the respective backers of the two.

In the HD-DVD corner, there were the likes of Warner Bros, Universal Pictures and Paramount Pictures. In the Blu-ray corner, there was Walt Disney, 20th Century Fox, Metro-Goldwyn-Mayer and Sony Pictures. It led to a situation where some films were only released on one particular format, and it was down to the consumer to decide which side to go for. There was always a risk of building up a HD library only to see a format become obsolete. In this case, HD-DVD was the loser.

Although the format had heavy backing from Microsoft, which had launched an external drive for the Xbox 360, even Bill Gates's company had hedged its bets. By not building a HD-DVD drive into the Xbox 360 and saying it would switch to Blu-ray if it became apparent that the format was winning, it didn't inspire confidence. As time went on, Microsoft seemed keen to distance itself from the format, going as far as saying the entire battle was down to consumer choice and that it was happy to wait for the result.

Things came to a head in January 2008 when Warner said it would drop HD-DVD support and concentrate on Blu-ray. This shocked Toshiba, which pioneered the format, but the Hollywood giant was adamant there was no going back, believing the presence of two rival, incompatible systems had been holding back the high-definition market.

"We believe that exclusively distributing in Blu-ray will further the potential for mass market success

and ultimately benefit retailers, producers and, most importantly, consumers," said Warner chairman and CEO Barry Meyer at the time. The HD-DVD camp was so taken aback that it cancelled all press interviews that month. Toshiba conceded defeat to Blu-ray on 19th February 2008.

It was a major triumph for Sony, which had created Blu-ray. The company had built a Blu-ray drive into the PlayStation 3 just as it put a DVD drive into the PS2, and it had been a bit of a gamble. Problems with the drive meant the PS3's launch had to be delayed, and Blu-ray pushed the price of the console to £425. Yet it ensured that those who bought the console could hook it up to their hi-def televisions and immediately grab themselves an armful of movies. Having an add-on for the Xbox 360 was not quite the same; having to make an additional purchase is always going to make adoption harder. Sony's decision boosted the number of people who could play Blu-ray discs, and it helped Blu-ray to outsell HD-DVD by a ratio of three-to-one.

All of this caused the brickbats to be brandished for Microsoft. *Transformers* helmer Michael Bay, a backer of Blu-ray, suggested Microsoft only backed HD-DVD to create market confusion and added, "Microsoft wants both formats to fail so they can be heroes and make the world move to digital downloads." There were also a fair few who believed Microsoft should have allowed HD-DVDs to be used for games.

But would that have helped to save the format? It's true that the company did consider using HD-DVD for games when it was putting the machine together, but it decided that Xbox Live in combination with a hard drive in more expensive models meant the console was secure enough without it. What it showed ultimately, though, was that competing formats seldom work out well for the consumer. Pity those who invested in HD-DVD, and let's just be thankful there's only Ultra HD Blu-ray this time around.

has since been working to author, test, certify and replicate the tools and processes needed for interoperability between players and software. The march of progress is very much on.

But what is most stark is that there is no competing technology this time around. There is no Ultra HD HD-DVD alliance breathing down the Blu-ray neck, and there may be a very reason for that. This is a format born more out of necessity: the rising number of Ultra HD televisions being manufactured and bought are bringing a greater demand for content. Yet because of the media-less ways in which people are consuming television and film via broadband, other companies may well have shied away from taking on Ultra HD Blu-ray, fearing it could be money down the drain. The thoughts of HD-DVD remain stark in people's minds, and while that is a good thing for consumers, it's ominous for the future of optical disc technology.

The Specs

But what can Ultra HD Blu-ray do? Well, the stats line up very well: Ultra HD Blu-ray can deliver content in up to 3840 x 2160 resolution, and it will support 27 times more pixels than standard definition television and four times as many as full HD, which is why Ultra HD has also been dubbed 4K by a few



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manufacturers and industry watchers (presumably Ultra sounds more hip and cool). It has more vivid colours, with Ultra HD Blu-ray able to display 76% of the visible colour spectrum as opposed to the 35% of full HD. It beats the paltry RGB output of those old-fashioned bulky things we used to stash in the corner of the room before wall-mounts became the in-thing, of that there is no question.

Ultra HD Blu-ray also supports progressive frame rates of 24, 25, 50 and 60fps, which will make for a smoother motion image, and it will allow people to watch movies such as *The Hobbit* – released at 48fps – as director Peter Jackson intended. On top of that will be better audio tracks. It will be possible to have Dolby Atmos and DTS:X support, which should help to blow the eardrums. In short, Ultra HD Blu-ray is a better format all round, and for those who really want the best visual experience, it's the very best that there is. It can store up to 100GB of data by not only adding an extra layer to dual-layer standard Blu-rays but squeezing on more data (33GB per layer as opposed to 25GB per layer as we have now). But is all this coming too late?

As we've seen, people are tending to stream more and more content, and those companies are not resting on their laurels. The BBC may not be broadcasting in Ultra HD, but it has been trailing some Ultra HD content on the BBC iPlayer, and as long as people have at least 20Mbps connections, it should work a treat. Netflix also allows for Ultra HD streaming, working with a range of televisions and set-top boxes, including Nvidia Shield, Roku 4, TiVo Bolt and the new version of Amazon Fire TV. Interestingly, people can stream in Ultra HD on Netflix through compatible smart Blu-ray players. Will people continue to go out in droves to buy physical media with these kinds

What About Existing 4K Discs?

Forget them. Don't even go there. They are not Ultra HD Blu-ray in any way shape or form. Films that advertise themselves as being "mastered in 4K" are just that: movies that have been mastered in Ultra HD. But when you actually view them on your television, you are seeing them in the 1920 x 1080 resolution of the Blu-ray format. There are no Ultra HD Blu-ray players on sale right at this very moment, so hang fire before going out and snapping up lots of 4K discs. The same goes for buying the currently advertised 4K Blu-ray players: only those with the Ultra HD Blu-ray logo will play Ultra HD Blu-ray discs.

“Ultra HD Blu-ray will support 27 times more pixels than SD television”

of facilities to hand, and could this affect any future physical media developments?

For now, people are likely to desire a physical format for the latest tech televisions, which means Ultra HD Blu-ray and physical media will have their place. For one thing, physical media offers far more choice than the streaming services, so if you really want to watch a particular film or television programme, then it may well be that the only way to do so is to buy it. With a disc on the shelf, there is no danger of a movie being pulled from the library, or a decision such as Netflix not renewing its deal with Epix scuppering your evening. Ultra HD Blu-rays will transcend licences and present people with a permanent, personal library. There is no reliance on broadband, no issues at all with buffering, no worry that you're going to hit traffic congestion. It's going to be as crisp as you can get it, but there is still a nagging feeling that fewer people are going to want to replace a bulk of their content from the older formats to the new. The diminished conversion rates will make it harder to justify any further physical media advances.

In the past, it was easy to see why people would switch up. People would re-buy content they already owned on VHS on the new DVD format because the quality difference was so very stark. The images and audio were crisper and the range of extras presented added value and a chance to get more out





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of a release. There was no rewinding or worry that the tape would degrade. At their peak, DVD sales were generating more than \$20 billion annually for the industry, and the technology was seen to be so suitable for many that when Blu-ray emerged, consumers were slow to adopt it.

Not only were the costs of Blu-ray higher, but the large installed DVD base was hard to shake. Satisfaction with the old is always a bugbear for the creators of the new, and that is going to be the struggle facing Ultra HD Blu-ray. What does it really offer that is better than Blu-ray? Will it really make much of a difference over DVD. On a technical basis, the answer is yes, but on a practical one, in the homes of the mainstream, is the difference going to justify the cost and, to that end, even if it does, will anyone really want to go any further or believe that it's even possible?

All of the expectations are that Ultra HD Blu-ray sales are going to be slower, still so it could be that it becomes a niche

66 It seems that Ultra HD Blu-ray will be the last of the optical disc technologies 99

format for those who want high end. If that's the case, then there will be little appetite to further it with another mass-market format, perhaps for the eventual rollout of 5K, 8K or whatever is due. But despite all that, there is a sense that we really should be trying to make the most of Ultra HD Blu-ray, because the content that is coming our way seems promising enough.

What's Out?

A number of the major studios are actively involved with Ultra HD Blu-ray, so this year is going to see a host of releases, with many of 2016's blockbusters earmarked for the format. By pumping out many titles, the aim is to make people aware of the formats and the benefits of it. The image quality and sound will be promoted, as the studios hope that enough people care and want to adopt it. In the same way that not everyone takes



Top Of The Flops

The Blu-ray Disc Association has overseen development of Ultra HD Blu-ray, which is the brainchild of one of its founder members, Sony. But as the company knows only too well, introducing new formats is not always an easy task.

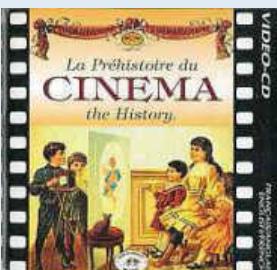
Betamax

This was Sony's rival to JVC's VHS, but although picture quality was better, it was hampered by a strict licensing programme. With VHS, it was pretty much open season. Some say Sony's refusal to allow porn on Betamax hastened its demise, but there were other problems. In America, a Betamax tape could hold just 60 minutes – three times less than VHS.



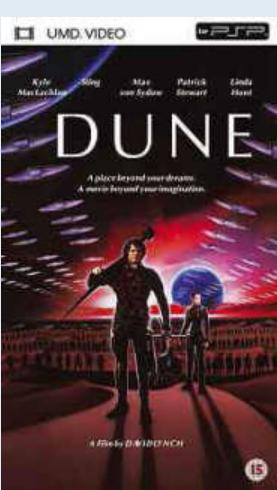
Video CD

In 1993, Sony got together with Matsushita, JVC and Philips and created the Video CD. It did extremely well in the Asian market, the inexpensive discs and players proving attractive. But in the rest of the world, it just didn't take off.



UMD

A propriety Sony format for use in the PSP, it was hoped UMDs would prove popular for films. Owners of the handheld largely ignored UMDs for this purpose, however, put off by the price and the fact that watching movies on DVD or Blu-ray on a larger screen has tended to be of greater appeal.



up HD television content on services such as Sky, there will be a fair few who are happy with the way things are, but for Ultra HD Blu-ray, it will not be for the want of trying.

Warner Bros is releasing *Mad Max: Fury Road*, *San Andreas*, *The LEGO Movie* and *Pan*. Sony will bring out *The Smurfs 2*, *The Amazing Spider Man 2*, *Salt*, *Hancock*, *Ghostbusters* and *The Fifth Element*. 20th Century Fox will have *Fantastic Four*, *Wild*, *Life of Pi*, *X-Men: Days of Future Past* and *The Maze Runner*. But there are some yet to announce anything, with Universal and Paramount staying quiet and Disney yet to confirm if *Star Wars: The Force Awakens* will get the Ultra HD Blu-ray treatment. What's more, pricing has yet to be announced, so expect anything from £20 to £30 a disc once they reach these shores (it's likely we won't see Ultra HD Blu-

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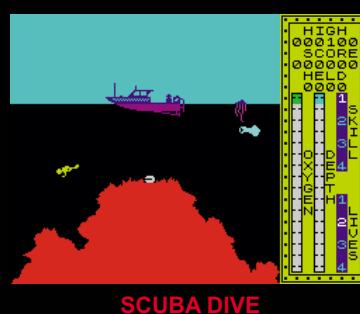
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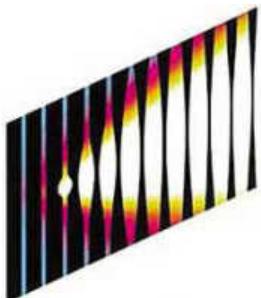


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**SONY
PICTURES**

ray players over here until a few months after they've debuted in the US and Japan).

One of the important things that will drive adoption of Ultra HD Blu-ray players, though, is – perhaps perversely – the ability to play standard Blu-ray discs, which means people won't need to ditch their existing library and can swiftly move up. It was the same with Blu-ray players able to play DVDs and upscale their quality, and it gives hope that, should another format be released in the future, the

same would happen and give the feeling that physical media investments are not being wasted.

Another crucial aspect is the Digital Bridge, which will allow users to make an exact copy of a supported disc – that

“By pushing technology, the pleasure we derive from our entertainment can only be heightened”

is, one which a studio allows to be copied. It would allow people to watch films and programmes via media players, tablets and portable hard drives. Of course, there is also the capacity to use Ultra HD Blu-rays for games: Sony is considering an enhanced PlayStation 4 that supports Ultra HD Blu-ray and yet, according to Sony Computer Entertainment vice president Masayasu Ito, there is a concern: "How many units of this enhanced PS4 will we be able to sell? And how much will we sell them for?" These are good questions for any manufacturer to ask and why many believe Ultra HD Blu-ray will be the last of the physical formats. But for Sony to question it should set off a few alarm bells for the future development of optical disc media.

After all, if the company that not only helped to make DVDs mainstream by putting a DVD drive into its PlayStation 2 but

also ensured Blu-ray was integral to the PS3 is questioning the use of the next advancement in physical media within a revised PS4, then perhaps Ultra HD Blu-ray will be the peak of optical disc technology. Indeed, all the indications are that any future physical media will revolve around solid-state drives. It looks unlikely to happen any time soon, but it appears firmly on the agenda, and that would be the nail in the coffin for anyone hankering after building a new library out of a new format.

For now, though, we should be enjoying what is about to come. By pushing technology, the pleasure we derive from our entertainment can only be heightened. We may not see more layers added to optical discs; we may not see another format; but we are going to see Ultra HD Blu-ray and all the excitement of seeing what that may bring. We'll watch with interest, that's for sure – with a big bucket of popcorn in hand. **mm**

Should You Adopt Early?

It's always the question on every tech-lovers' lips: should you take the plunge with a new cutting-edge piece of kit. Recent history is littered with casualties and problems, which usually centre on price and whether a tech will last. Those who bought the £399 Blackberry PlayBook, for instance, were left reeling when, within months, it was retailing for less than half that cost. Purchasers of the Nintendo 3DS were equally incensed when the price dropped from £229 to as little as £115.

There is no doubt that early adoption can be a costly business, since there's no way of telling what technology will take off in the long term. AC was deemed better than DC, and the audio cassette triumphed over 8-track. VHS beat Betamax, but this was perhaps less to do with the tech quality and more to do with the inability to squeeze enough porn on a shorter-lasting Betamax tape. But what drives us to adopt tech early?

"Obviously consumers are heterogeneous, because some people decide to be an early adopter, while others take a wait-and-see approach," says Jay Pil Choi, professor of economics at the University of New South Wales, Australia, who has written a paper on such herd behaviour. "Early adopters tend to be so-called 'techies' who are interested in the most up-to-date gadgets. For them, possessing new products with fancy features may be similar to a fashion statement. So the psychology driving them to adopt early may be similar to why we have fashions and people queue for the first run blockbuster movies. This phenomenon is also driven by well-orchestrated marketing efforts."

The problem is that when adopting early, you could fall prey to a buggy product, with malfunctioning software a particular issue. Costs are usually higher initially, and there is a danger that, as we have seen, the product becomes obsolete (HD-DVD drive, anyone?) When it comes to Ultra HD Blu-ray, you may want to sit things out for a little while to see how the market fares and how fast the prices will drive down.



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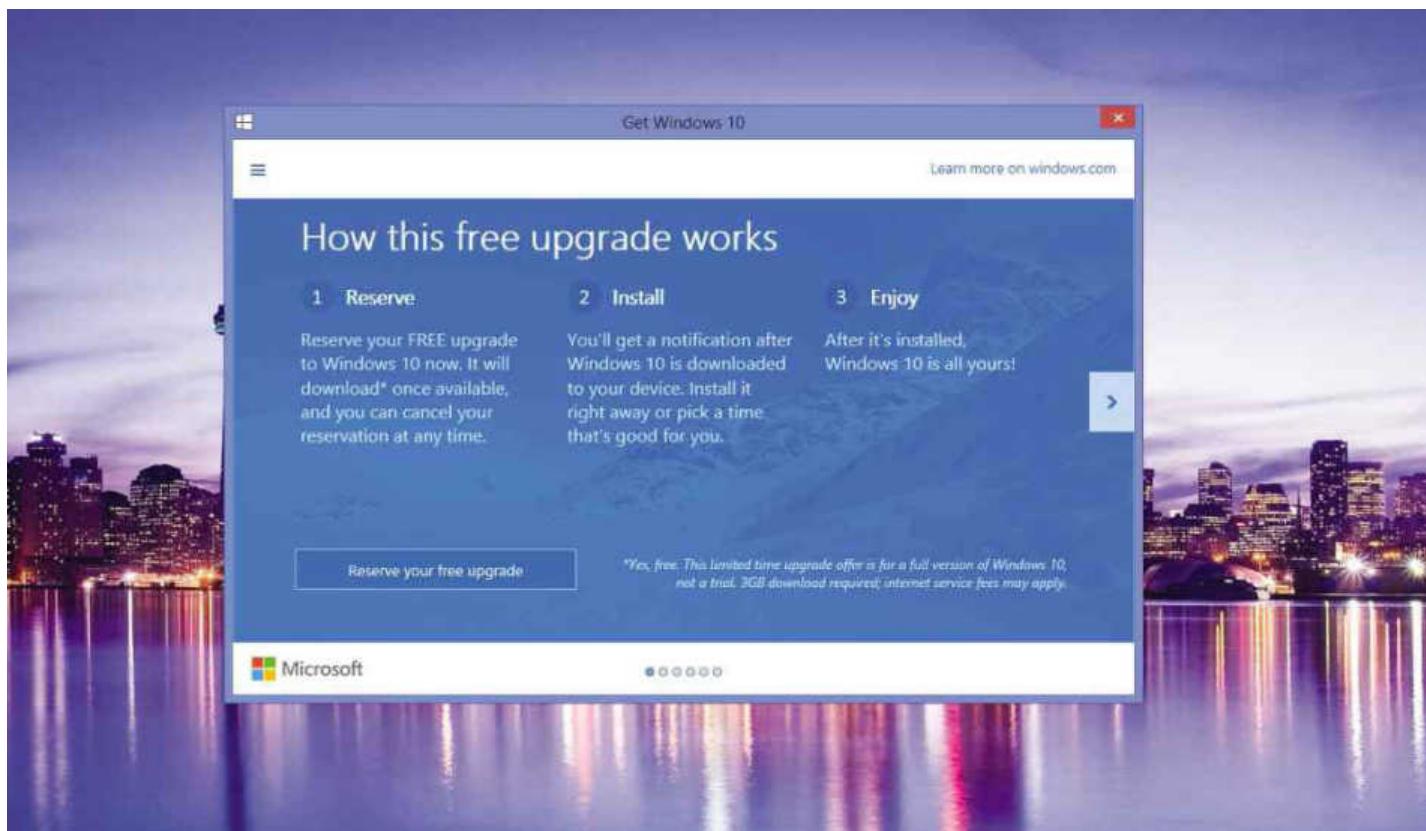
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10 Good Reasons To Upgrade To Windows 10

**Mark Pickavance presents the flip-side of sticking with
Windows 7, and why you might want to consider upgrading**

In a previous issue, I talked about many valid reasons why you might want to stick with Windows 7 instead of accepting Microsoft's unique offer of a free upgrade to Windows 10. Yet there are a number of aspects to Windows 10 that might convince you to switch over and leave Windows 7 behind. Here are some of them:

1. It's Free, Stupid!



Yes, this is the very first and possibly only version of Windows that will ever be free.

Given the rarity factor, surely that's not something you should pass up? Well, if you read my previous ten reasons why you might want to stick with Windows 7, then there are a host of perfectly valid excuses to pass that hat.

However, for most people, if they don't mind the implied learning curve, a free upgrade to Windows seems like a wonderful deal, and one that you should probably take.

66 If you think that in five years you'll still be using it for whatever reason, when Windows 7 support ends, then the choice is obvious 99

Remember, the offer isn't open indefinitely, so those wanting to transition at no cost need to do it before 29th July 2016. After that point, a retail version of Windows 10 Home 64-bit is £99.99, and the Professional 64-bit release is £189.99.

You can get it a little cheaper if you get a non-transferable OEM licence, though this pricing does highlight that those with Windows 7 Pro do get an even better offer than those with the Home version.

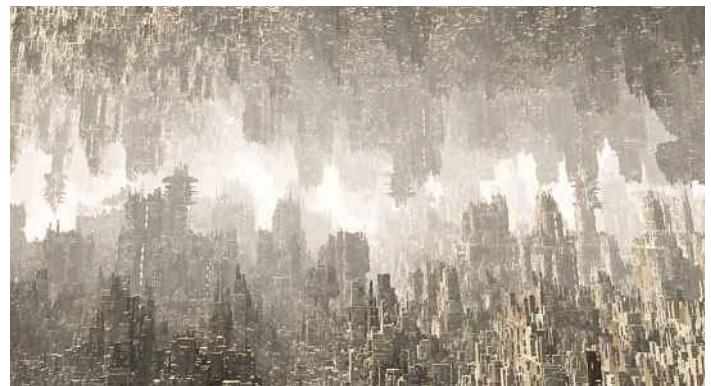
Obviously, depending what they're seeing in terms of conversion rates, Microsoft might extend that deadline or blend in the pricing with a discounted retail release. But don't assume either of those scenarios if you intend to upgrade, because they're not going to be any more advantageous than what is available now.

Note: the upgrade applies only to Home and Professional versions of the OS. Those with Enterprise installations will be

paying for Windows 10 whatever, so if you have one of those licences, then you don't have the option for free ascendancy.

Given the cost implications of ignoring this deal, you need to be sure you won't change your mind after July 2016.

2. DX12 Games



For those who came to computing in the last decade, it's worth noting that when DirectX first appeared, it wasn't the API method of choice for driving 3D games. Most of the early titles either used proprietary interfaces, like Glide API on Voodoo Graphics, or modified versions of OpenGL. It wasn't until DX6.1 appeared on Windows 98SE that it began to gain ground, and on Windows XP version 9 became the 3D graphics API that most games used.

Then Microsoft made DX10 a Vista exclusive, and also told the world that since the Xbox 360 arrived, PC gaming was dead, which was odd, given it also used DX9. The mess that refusing to give DX10 to XP caused is still a factor in PC gaming, as many developers just ignored DX10 and subsequently DX11. But the differences between DX9 and the two versions that came after were mostly subtle, so there wasn't a radical difference between games coded for them.

How does DX12 change all that, being that it is exclusively on Windows 10 and the Xbox One? Rather than being based entirely on the architectural model of previous DirectX versions, DX12 has been configured to work much more like AMD's experimental API Mantle. If you've not seen a demonstration of what Mantle can do, it's worth checking out some of the examples, because it makes significantly better use of existing video card hardware than DX11 or DX10 ever could.

Therefore, a DX12 title running on the same game should either be able to render more frames per second or offer significantly better detail levels without a GPU upgrade.

It does this by turning the calls to the video card into a less sequential exercise, with the aim to fully occupy the GPU, instead of leaving it waiting for instructions.

In some of the benchmarks, this new approach turns out to be multiple levels of performance better than before, so DX12 could transform PC games and make them seem much more like console titles in respect of consistent frame-rates. In short, without Windows 10, there is no DX12, and therefore no gaming performance bonus.

The only fly in this ointment is that at this time there aren't really any DX12 titles to speak of, and until the percentage of Windows 10 machines probably exceeds 25% of all PCs, we won't see many.

DX12 is certainly a 'jam tomorrow' promise, though a tempting one for those who'd like to see smooth gameplay with cooler running systems and lower GPU requirements.

3. Support Timescales



For those unaware, Microsoft has lifecycles defined for all its software products and in particular its operating system releases.

Previous to Windows 10, after a product is released, it goes through a series of modifications, partly in the form of service packs and also through mandatory updates. These end when the OS reaches the 'end of mainstream support' date, where the software enters extended support mode, and it gets no new features or developments from this point.

During this final support phase Microsoft will only fix major problems or significant security holes as they become apparent. And when that ends the OS is on its own, as it hasn't been available to purchase for some time, and usually Microsoft has released subsequent versions to replace it.

The next OS to fall off that conveyor will be Windows Vista. Launched to the public in early 2007 it hit the end of mainstream support in April 2012, and is due to exit extended support in April 2017.

But the one that interests most people, because hardly anyone is still using Vista, is Windows 7. The critical dates there are that it entered extended support in January 2015, and that period will end in January 2020.

Therefore, Windows 7 has just five years of life left before Microsoft no longer supports it at all. The only reason to believe that date might get pushed back is that Windows XP got 13 years between launch and the final support axe, so Windows 7 might yet get some wiggle room on that specific date.

The other important epoch to note is 31st October 2016, as that is the date from which you won't be able to buy Windows

Client Operating Systems	Latest Update Or Service Pack	End Of Mainstream Support	End Of Extended Support
Windows XP	Service Pack 3	14 April 2009	8 April 2014
Windows Vista	Service Pack 2	10 April 2012	11 April 2017
Windows 7	Service Pack 1	13 January 2015	14 January 2020
Windows 8	Windows 8.1	9 January 2018	10 January 2023
Windows 10	N/A	13 October 2020	14 October 2025

7. Comparing all this to the Windows 10 upgrade, that won't hit extended support until October 2020, and support will end entirely in 2025.

Ten years in computing is a very long time, and you're unlikely to still be using the computer that you upgraded by then. If you think that in five years you'll still be using it for whatever reason, when Windows 7 support ends, then the choice is obvious.

Here is an overview grid to show you all the relevant dates for all the most recent Windows releases:

4. Security



According to the blurb, Windows 10 has more built-in security protections to combat viruses, phishing and malware, and Microsoft claims it's the most secure Windows ever! Well, it would say that, wouldn't it?

But Windows 8 and 10 were built on the knowledge that Microsoft gained through Windows 7, Vista and XP. So the idea that it's built to be more robust should be more than just marketing hype.

Indeed, Windows 10 has few weak points overall, allowing the avenues of attack to be narrowed, and therefore in theory better protected.

But it also has a few other twists that help it stay more secure. One of these is multi-factor authentication, something that's migrated from the mobile universe to the desktop one. Being able to use your phone or tablet as part of an interconnected security web to protect your desktop PC or laptop makes them all more secure.

You can even specify that a device must be connected by Bluetooth or wi-fi to allow access, restricting where it can be used and how.

Some of that thinking also coloured how the Enterprise functionality is being handled in Windows 10, with the ability to segment personal and corporate data stores entirely under a single login.

Once an email account or data is stamped as 'corporate', it is automatically encrypted, providing an extra layer of protection.

In addition to trusted data, Microsoft also extended the concept of trusted applications, where corporate machines can be templated to only run specific tools and even specific versions. This negates the ability for malware to run on the computer and modify an existing tool to do its bidding.

Some of the full capabilities of Windows 10, especially in respect of the Enterprise functionality, has yet to be deployed,



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but as time goes by, this will be the most secure version of Windows by some considerable degree.

Factor in biometric features, and they could be the icing on this security cake.

5. Universal Apps



It's worth accepting from the outset that full-screen apps designed for the tablet touch environment haven't been a huge success story for Windows 8.x. People just don't use them, mostly because the desktop equivalents are significantly better, almost without exception.

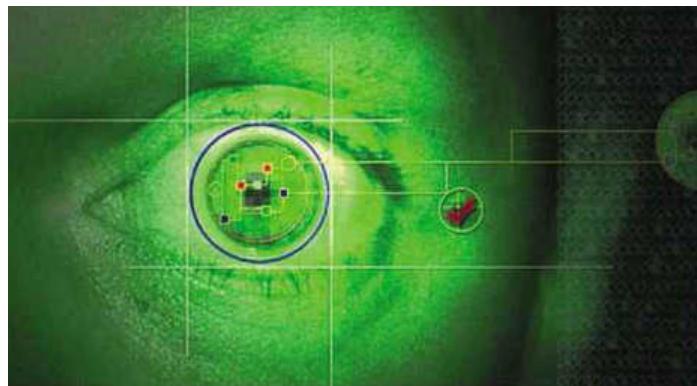
However, the Universal Application model as presented in Windows 10 does have some new tweaks that might make it more attractive to the few people who have so far developed for this platform.

One of these is the ability to install and maintain desktop Windows 32-bit applications through the Microsoft Store, like it was a Universal App. That might seem a really unimportant change, but once companies start using this mechanism, it brings with it the possibility of a rapid reinstall and data transfer that we've all dreamed of over the past 25 years.

Already it's possible when installing a new Windows 10 PC or reinstalling to have it put back all the Universal Apps from a previous installation. Once Win-32 tools are included in that, then as long as the data is secured correctly, rebuilding a PC from a bare-metal scenario could be much less challenging.

At this time, Universal Apps have yet to set the world on fire, but the infrastructure built to deliver them still might be very useful, even if the apps are less so.

6. Biometrics



Passwords and key codes are the bane of most people's computer usage, because they more often stop you getting into your own computer than anyone else.

We've seen fingerprint readers on some systems, though they can be fooled, allegedly. And Google deployed a form



of face recognition that could be equally circumvented by creative individuals. How has Microsoft improved on these options? Windows 10 has a biometric system, called 'Windows Hello', which includes numerous ways to identify a user account including fingerprint, iris and face recognition. The visual recognition methods are based on the work that was done with the Xbox Kinect, and it's put them not only in the desktop version of Windows 10, but also its latest Lumia mobile phones.

With these solutions it isn't necessary to press a key to initiate a login. You simply place yourself in front of the computer or hold the phone up to your face, and you're almost immediately recognised and allowed access to your account.

“ Hopefully the RealSense cameras won't just be a developer toy, and we can all just assume our computer knows us by our appearance alone ”

Previous facial recognition software usually fell down in that it couldn't distinguish between a person and a photograph of them. In order to stop that Windows Hello needs an Intel's RealSense 3D camera, because it can see you in infra-red and therefore determine if you've alive and not just a stick with a picture glued on it.

And while that solves one problem, it immediately introduces another, because not every laptop will come with an Intel RealSense camera. Also, at this time, buying one for your desktop computer appears to be really challenging, unless you signed up for the Intel RealSense Developer Kit. If you get one of these and at least a Haswell-class CPU, or if you're lucky enough to have a laptop with Intel's special camera in it, then you can have your PC recognise you.

But once this technology becomes commonplace, if it does, then Microsoft intends to expand the usage beyond just being a replacement for passwords. One of these is as a means to sign off on payments, using a secure system called 'Passport'.

According to Microsoft 'Passport' will enable you to "access a growing set of websites and services across a range of industries – favourite commerce sites, email and social networking services, financial institutions, business networks and more."

For those who have used Windows Hello, the only complaint I've seen is that it recognises you so quickly, many people

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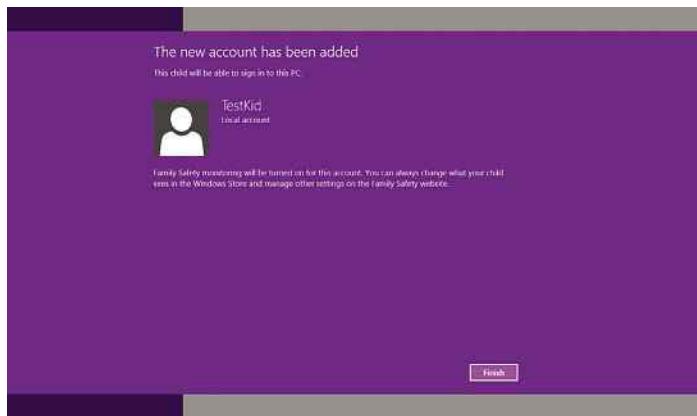
SMASH IT!



weren't sure if their PC was secure at the point it was activated. There are also some security concerns, given that the camera is on all the time when the system is locked.

Hopefully, the RealSense cameras won't just be a developer toy, and we can all just assume our computer knows us by our appearance alone.

7. Family Friendly



One of the major changes that Windows 10 introduced (though it was road tested in Windows 8.x) was the use of a Microsoft account to push settings to the cloud, where they can be influential when you have more than one PC or Windows device.

A demonstration of how this can be an advantage is well presented by the family-friendly aspects of this connection, because it enables a parent to control their children wherever they log into a Windows system.

Having presented ten good reasons to stick with Windows 7, and now another ten to make the leap to Windows 10, you might wonder what will do ☺

It works like this: add your offspring to the home PC using a Microsoft account, and then apply whatever family restrictions you've decided are appropriate. Once this is done, those limitations will be inherent to those account logins, regardless of where they're used.

Microsoft has promised that it will be extending this functionality so you can register a payment system that a parent can control, but the kids have access for budgeted purchases through the Microsoft Store.

It doesn't stop them using someone else's account or setting up a PC with a local account, but for those who feel inclined to exercise more control, it certainly has advantages over previous Windows releases.

8. Hybrid Mode



When Microsoft launched Windows 8, it obviously imagined a future where every desktop PC would have a touch-screen. This was a future that never happened. As a result, desktop users and all those on laptops without touch were damned with a tiled interface that was perfect for less than 5% of the installed user base.

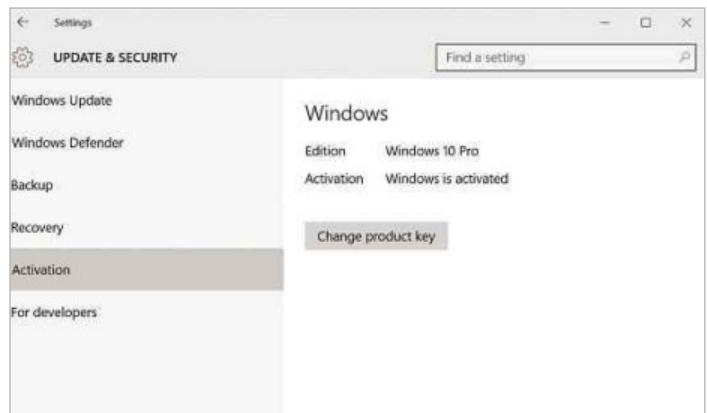
It was probably one of the critical factors in the failure of Windows 8, and in Windows 10, Microsoft decided to go back to actually supporting the vast majority of its customers.

However, it does still have tablet ambitions, and introduced 'Hybrid' mode, where an interface more like Windows 8 could replace the normal Start menu interface, should the user be operating exclusively with touch.

For those machines that have detachable keyboards, the switch can be made automatic, in both directions, allowing you to get the best of both worlds and making the system touch-aware.

For those who didn't hate the Windows 8 interface, you can also force it to be the norm even on a desktop computer, should you be that keen on it.

9. Auto Activation



Activation is, to this writer, possibly the worst thing that Microsoft ever came up with, with the possible exception of Clippy. They're silly codes that can be easily mistyped or lost,



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or they can be right but won't activate for some unknown reason.

Far too late, Microsoft realised what a royal pain they were, and in Windows 10 it's introduced a new model, which retains the control it likes but hides most of it from the user.

The means by which it does this is the Microsoft account, because once a PC is activated with an account, the identifying codes from that machine and the licence are stored away in the cloud. Should that machine need entirely rebuilding at some point, once you log into Windows 10 using that account, it will be automatically activated. No code, no annoying messages; it should just work.

Exactly how seamless this actually is in reality we've yet to see, though so far I've noticed that it appears to work as advertised. This still leaves the rather grey area of how much your PC hardware is allowed to change before it isn't considered the same computer, but I'll leave you to debate that with Microsoft technical support.

In theory, Windows 10 offers activation without the aggravation.

10. No More Naggings



Have you ever been stuck with a small child on a long road journey, where five minutes after you set out, they ask 'Are we there yet?', and they do that repeatedly for the next four hours?

That's what being a Windows 7 user is becoming a little like, because from the point of Windows 10 becoming available, we've been under assault in a way that really turns most people off.

The latest attempt to make us upgrade is a panel that pops up every time you log into your PC, giving you two options. One is 'Upgrade Now' and the other is 'Start download, upgrade later'.

There are two points that need making about these options, the first being that there obviously isn't a third 'go away and leave me alone' choice. The other is that the second button is largely superfluous, because Microsoft decided to download the installation files to my PC a few weeks ago, without any choice or consultation whatsoever.

It's already warned that it's not going to give up, and it will escalate these annoyances and change the upgrade routine so that it runs automatically, depending on how your upgrades are configured in the spring.

While you can remove some of its systematic user abuse tools, there appear to be only one way to end them permanently, and that's to upgrade. I'm not sure about my position on giving in to this type of systematic abuse, but it is one of the advantages of saying yes.

Final Thoughts

Having presented ten good reasons to stick with Windows 7 and now another ten to make the leap to Windows 10, you might wonder what I will do.

My choices are limited, because to do my job I need to keep moving forward with technology, so I've already upgraded one machine. However, that was a laptop, and it had Windows 8.x on it. And 8.x is a version of Windows that I unreservedly hated.

I'm not sure that it's any better with Windows 10 on it, but I can test out anything that needs the latest version of the OS on it. I've also got a couple of test platforms that have it, though they also have Windows 7 on them too, for good measure.

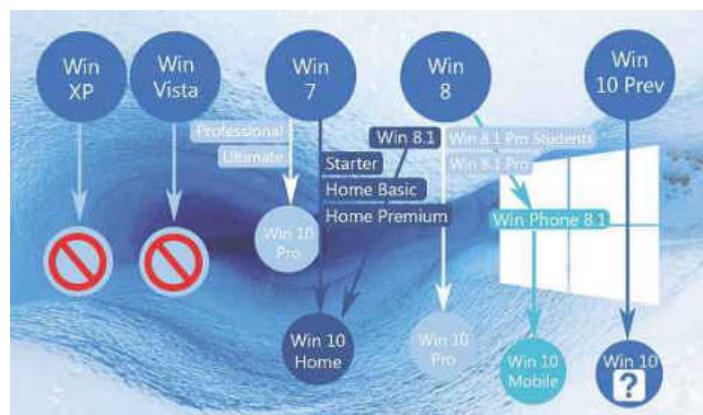
Critically the PC that I'm using to type this up is on Windows 7, and it will probably stay on that, because I can't afford to have any working problems with it. Maybe in the next six months that position will change and I'll become confident enough to make the transition. But we're not yet there, and I'm beginning to wonder if the initial steam in Windows 10's step is fading away. What's really odd, and I can't explain, is that the numbers of Windows 8.x installations doesn't appear to be dropping like one would reasonably expect. And given the boost that having all new systems come with Windows 10 should give it, the numbers aren't that impressive.

I'm drawn to conclude that giving away Windows 10 for free might have come a little too late to actually stop this ecosystem sliding into oblivion, or at best being a sideshow to what else is happening in the computing space.

There is a fine irony in that when Microsoft launched Windows 10, I kept saying that this would be the last version of the OS ever, though it actually meant something other than the obvious way to interpret that.

What I'm doing doesn't really matter, because choosing to upgrade or not is a personal decision, and it's not one that I or Microsoft can make for you.

But don't fret over it, because given the shifting sands of the computing topology, it might well be that whatever you do won't be the wrong choice in the longer term. **mm**



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STAR WARS
BATTLEFRONT
EA

Has ‘Offline’ Become A Dirty Word?

Mark Oakley prefers single-player campaigns, but does the industry really care about gamers like him?



If running around virtual environments with a huge gun is your kind of thing, the arrival of *Call of Duty: Black Ops 3* and *Star Wars: Battlefront* was most likely fantastic news. Even if it's not, we can take it as read that Activision's long-standing shooter franchise is insanely popular and, hey, everyone loves *Star Wars*, right?

If you're an older-generation console gamer, however (and by older generation, I mean PS3 and Xbox 360 – yes, we know it's weird to refer these machines in such a way) then you may feel you've been shortchanged. While the latest *Call of Duty* PS4, Xbox One and PC versions allow for the game to be played in a raft of online multiplayer modes as well as in the form of a single-player 'Campaign', PS3 and Xbox 360 owners won't be getting a Campaign mode at all. The game will be cheaper to buy, but it's going to come with just multiplayer and Zombies gameplay. The lack of any single-player campaign mode comes down to the technology of those last-gen machines – they can't handle the extra functionality, according to Activision.

CoD isn't the first title to eschew a single player mode, though. Tom Clancy's *Rainbow Six Siege*, which came out in December for the Xbox One, PS4 and PC, focuses on online play, with offline gaming relegated to a series of training missions. As for *Star Wars: Battlefront*, that's going to have an offline 'Missions' mode that supports bots, but again that's essentially for training you up to get ready for the core online multiplayer experience – there is no single-player campaign.

This is threatening to become something of a trend since the industry has ushered in the next-generation of consoles and graphics cards. Is it really what gamers want from their £40-50-plus AAA titles, though? What happened to the solo gamers who want to spend a solid hour or ten on a captivating offline campaign?

Fancy A Game?

Time was when multiplayer gaming meant arranging a games night with friends from school/work/your local club of choice, complete with rustling bags of crisps, a beer/soft drink of your choice and lots of laughter/shouting/fighting to accompany every race won, every goal scored, every man shot. This does still happen, of course, and the good house Nintendo has tried its best to keep that spirit alive.

The reality is that online play has pushed offline multiplayer to one side, patting it gleefully on the back as it saw it on its merry way. Broadband internet has helped, naturally, as now worries of gameplay lags and dropped connections are – while certainly not a thing of the past – less frequent. It's not just having a better, faster Internet that caused gaming to go online, though. The reality is that the gaming industry has increasingly moved towards that direction, bringing gamers along for the journey. Developers embraced the brave new world created by both Microsoft and Sony as they pushed their online services upon gamers. When the latest generation of consoles was released, Sony's PS Plus and Microsoft's Xbox Live were lauded as the only way to play and they were successful. Boy, were they successful.

Games began focusing more on exclusive content for online multiplayer. Beyond the initial game's release, developers and games publishers quickly took advantage of being able to draw gamers back to their favourite gaming worlds with downloadable content (DLC), encouraging them to spend more money as they did so. So, a game like *GTA 5* – a fantastic offline, single-player campaign title in its own right – seems to have found extra life via its Online mode, giving gamers better value-for-money. Or has it?

Does More Mean Better?

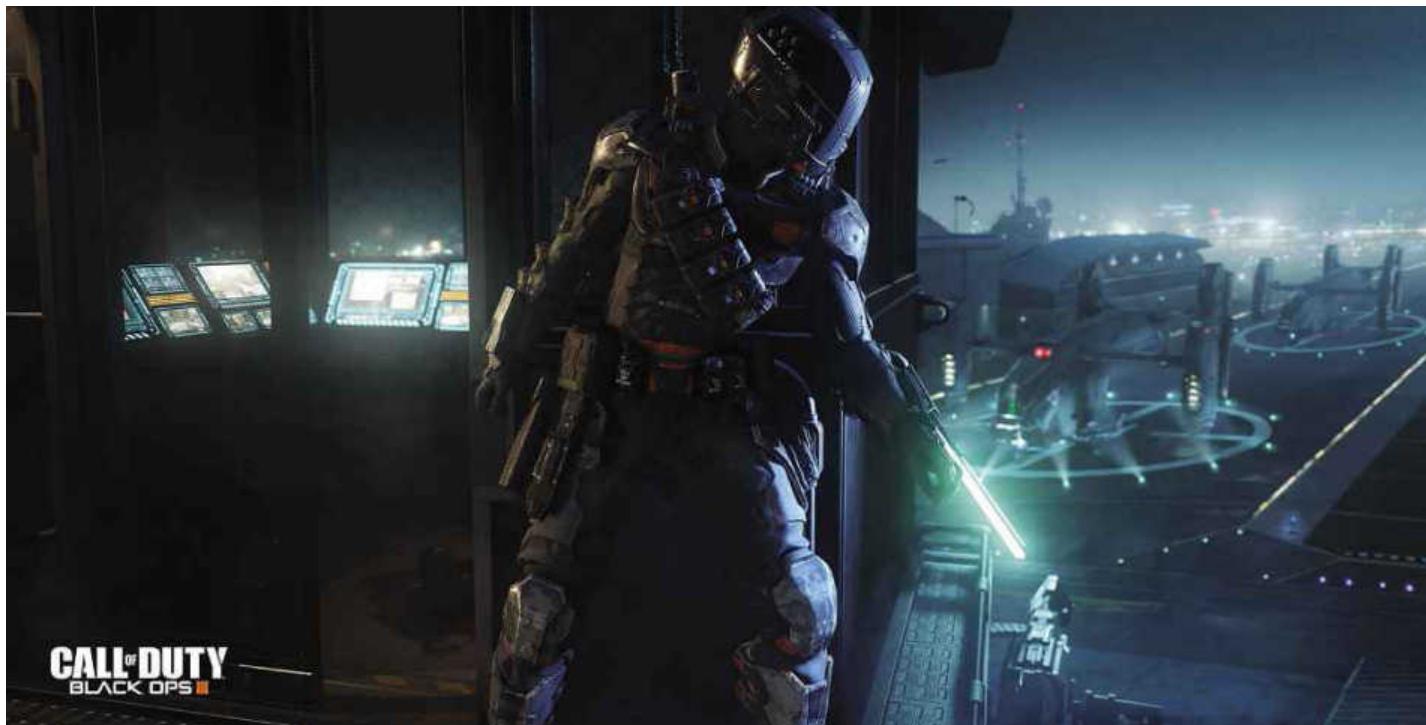
Let me take you back to early last year when PS4 exclusive *The Order 1886* landed. Reviews were mixed with the positives – outstanding, cinematic graphics, no loading times, immersive setting – soundly outweighed by the negatives – no replay value, no multiplayer or co-op modes, linear gameplay. While most criticism was saved for that linear gameplay narrative, stopping gamers from taking their own path, a lot of criticism was thrown at the title concerning its total lack of a multiplayer online mode.

This was a strange point-of-view to have. Sure, *The Order 1886* wasn't cheap to buy, but then show me a AAA title that is. The fact that the game cost so much money is more symptomatic of an industry that has been steadily ramping up prices for the past decade. The assumption that having a multiplayer mode would somehow make that cost more palatable is a misstep. *The Order 1886* was that rarest of things nowadays – a single-player shooter offering a dedicated campaign. That was it. There is no real reason to go in and play it again, that's true, but the experience itself is fantastic while it lasts. The feel of the game, the visuals – these are what will stay with you long after you complete the title. Isn't that worth the admission price alone? How many films do you rewatch again and again? Sure, you'll have some favourites, but just because I don't want to watch the *Lord Of The Rings* trilogy ever again doesn't mean that I didn't enjoy that immensely the first time round.

The issue of including an online multiplayer mode in a game that's aimed squarely at a single-player campaign market has been shown in the past to be a mistake if you don't get it right. When the *Uncharted* franchise added multiplayer to the second and third games, users took to the web to complain over the treatment of the mode from the developer. For a franchise that remains one of the best offline campaign experiences I've had on a console to date, the delicate balance of handling a solid multiplayer mode to back up a great single-player campaign is one that's important to get right if it's really going to add value.

Of course, if you get it right – like *GTA 5* or *The Last of Us* did – then it does undoubtedly provide for a longer-term and rewarding gaming experience. To automatically assume that offline is better, however, is naive.

I'm also a huge football game fan and the recent trend of adding a trading card style mode to the game, marketed as offering more gameplay for your buck, is wasted on classic football gamers like me. We just want to take our teams onto the pitch, so all these additional online modes are simply not aimed



at the core gaming experience. Unfortunately for many sports gaming franchises, the core online experience is all too often a disappointment with quitters, pausers and posers aplenty. It's also incredibly hard work.

Learning Curve

The online multiplayer world is all too often not a nice place to find yourself in. Abuse, cheating and cockiness all feature in the online space. Also, the starting point for new gamers coming in to online multiplayer environments is far behind the established players who have been spending hours upon hours to get good at a certain title.

The Last of Us is a perfect example. I've been playing its multiplayer *Factions* offshoot since I finished the campaign – and what a campaign, by the way – for months and I'm OK at it, but I'm always, without fail, up against seasoned shooters who round on me in an instant. They have the best weapons (likely by paying for the in-game weapons and skills that you can buy) and they know the online maps inside out. Whereas the single-player campaign mode was immersive, breathtaking and downright scary, online play is more often than not frustrating; annoying even.

Experiences like this have steered me away from online-only titles such as *Destiny* and *World of Warcraft*, as has the lack of time I have to put into these kinds of experiences. I have a young family, a wife and – bluntly – a life outside of gaming. I simply don't have enough hours in a day to dedicate to these experiences in order to get as good as I'd need to.

Yet companies are investing much more money in the multiplayer space. I know I'm not alone in embracing the single-player experience, but why don't gaming companies want to cater for gamers like me?

Money And Mates

The financial business of the gaming industry is the most important thing for developers, naturally. In the days before online, once a game was purchased then the developer had done their job and it was time to move to the next title in development.

Now, there are clear opportunities to actively sell in-game purchases to gamers to help them get better against superior online opposition. Downloadable content with additional mini-episodes, new maps, new characters – this has become the norm for many of the big AAA titles. Just as game developers can issue gaming updates to improve the user experience, so they can issue new content to a captive audience.

There is also the plain fact that while there are plenty of gamers who crave the solo experience, there are many who want to play in a social gaming environment. The guys in multiplayer shooters who are mocking you for dying all the time, who know the terrain like the back of their hand – they are a huge part of gaming these days. These gamers are more than happy to pay money to get even better online and to brag about it to their mates. For a late-30s gamer such as myself, this is all a bit of an alien concept but the reality is that I'm playing against a much younger, very different competitor online. Truthfully, I'm out of my depth.

As for the industry, the head of EA – no less – has said that the lack of a single-player campaign mode in *Star Wars: Battlefront* was always part of the plan, as the market data they rely tell them that very few buyers of these kinds of games bother with the single-player mode. With that in mind, they decided to ditch it.

EA is obviously not alone in taking this stance towards what players want from its games, and we have to take it at its word. It's a position that makes me a little sad, though, truth be tol. That's particularly true for a universe that's as rich with possibilities as the *Star Wars* one. The recently-released *Halo 5* for the Xbox One seems to epitomise where first-person shooters are at right now, with the online multiplayer experience gaining decent reviews while the single player campaign sounding like a confused, underwhelming experience.

A little while back, I read a piece on the web on David Braben's thoughts on *Elite: Dangerous* and its lack of an offline mode. There is a single-player mode, but it does need to be played online. The reason? The core of the game was designed around a multiplayer mode that was evolving and changing, centred around the collaborative nature of a multiplayer game. To recreate this in an offline, single-player setting would be impossible, said Braben.

My worry is that this view is becoming the norm in the industry as a whole, and that as multiplayer gaming is what gaming studios say the people want it will become the only game in town. Perhaps I'm in the minority. I know I'm not completely alone, though. **mm**

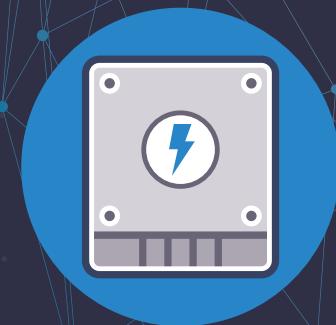


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Your Letters

Hidden Data Copy

A change in job has made me rethink my backup methods for my personal data. Using programs like BitTorrentSync and one or more cloud providers does make this all nice and easy and ensure offsite backups, but the threat of Ransomware is still very real – as using the former options provide real time backups.

Ransomware could destroy all my data and these backups before I know about it. As far as I am aware, no Ransomware currently looks for unmounted volumes to encrypt data.

I am aware I could copy to another HDD and disconnect it from all my network, but that requires me to remember to do this. I decided to try to mitigate against this threat automatically with the least loss of data.

I connected a spare HDD to my DLNA server and I created three partitions on it: one for a weekly copy of my data, one for a monthly copy of my data and one

for the MP3s for the DLNA server. I then formatted each partition ready for use (Drives Z and Y for my data – you can use whatever drives you like)

Once formatted, I went into a CMD prompt and I ran the command mountvol; Besides giving a syntax of the command, at the end it will prove information for each drive that is mounted. At this point, I made a note of the GUID associated with each drive:

```
\?\Volume{ad126752-a837-11e5-8cf5-8851fb82abaa}\
```

Z:\

```
\?\Volume{ad126759-a837-11e5-8cf5-8851fb82abaa}\
```

Y:\

After that, I created a batch routine that will mount my hidden drive and then use the robocopy command to copy my data. Once copied, unmount the drive. I create one for a

monthly routine and one for a weekly. Both use different drive letters incase both routines run at the same time - depending on how you configure this

Weekly.cmd

```
@echo off
```

: mount the drive for a copy

```
mountvol y: \?\
```

```
Volume{ad126759-a837-11e5-8cf5-8851fb82abaa}\
```

: and copy

```
robocopy \<source> y:\ /mir /r:0 /w:0 /xd <some folders I do not want to copy> /log:c:\home-week.log /tee
```

: dismount the drive so it is not visible – best protection I can get

```
mountvol y: /p
```

Monthly

```
@echo off
```

: mount the drive for a copy

```
mountvol z: \?\
```

```
Volume{ad126752-a837-11e5-8cf5-8851fb82abaa}\
```

: and copy

```
robocopy \<source> z:\ /mir /r:0 /w:0 /xd <some folders I do not want to copy> /log:c:\home-month.log /tee
```

: dismount the drive so it is not visible - best protection I can get

```
mountvol z: /p
```

For me, I run a few other routines at 10am each day, so while the machine is doing these tasks, it can do these too. The weekly runs on a Monday at 10am, and the monthly on the first day of the month at 10:00am.

Both run pretty quickly after the initial copy, and if you are unlucky enough to be infected by Ransomware, you may find this saves you by limiting your losses to either a week or a month (assuming you are aware).

Thanks, and a Happy New Year to everyone!

Jules

Caveat Emptor Of sneaky BT

If readers with a BT Broadband capped monthly allowance of 10GB are wondering where a large chunk of this allowance may be swallowed up each month, the answer is (surprise, surprise) BT!

During December 2015 I noticed that my monthly allowance had disappeared at an alarming rate. On average I use 5GB a month of my 10GB allowance, but in December I almost all my monthly 10GB was used up by the middle of the month despite the fact that I had not used my Bandwidth Allowance any more than earlier months in the year.

I downloaded/install an excellent program called 'Networx' to find out where my Bandwidth was going and to independently check my DL/UL speeds. The answer was shocking... I regularly log onto the BT Website and used their Speed Meter to keep a constant eye on the Upload/Download speeds. Before logging onto the BT website I took

a reading from Networx of Bandwith used so far that day. After logging onto BT and checking my DL/UP speeds I signed off and opened Networx once again. I was shocked to discover that before logging onto BT the Bandwidth used so far was 88.6 MB and after 154 MB. Logging onto the BT Website and checking my Broadband speed had used up 65.4 MB! Check the Speed Meter several times a day over the course of a month, and a huge chunk of Monthly Bandwidth Allowance would simply disappear without trace.

It is clear that from the beginning of December 2015, BT has decided that using their Website should be at a cost to my/your Monthly Bandwidth Allowance. This change in policy was not announced anywhere as far as I am aware. BT is one sneaky company! Caveat Emptor!

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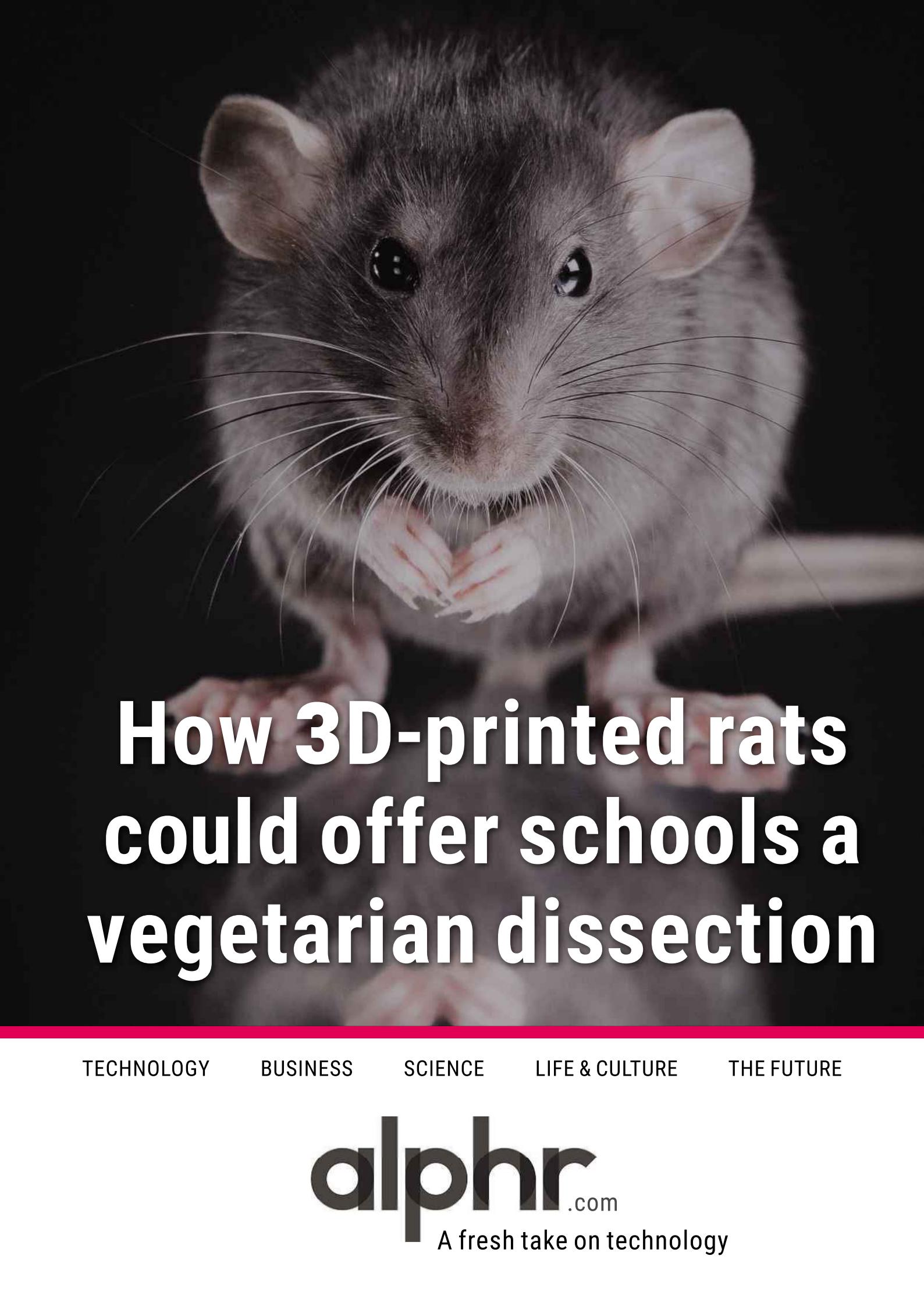
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Remembering...

The Hobbit

This week, David sits down and sings about gold

Pale, bulbous eyes and having Thorin singing about gold are a couple of examples that will undoubtedly spark fond memories of playing *The Hobbit* on the Spectrum, C64, Dragon or BBC computers back in 1982.

The Hobbit is one of those games that everyone of a certain age has played at least once in their lives. Regardless of whether you owned one of the aforementioned 8-bit machines or not, there was a pretty good chance that at some point in your youth you viewed the line-by-line loading of the images and marvelled at the block fill colouring.

If you were lucky, you not only owned the large black box, with the tape inside, but you also got a copy of JRR Tolkien's master novel as well. The last time I remember a book being sold with a game was *The Forest of Doom*, which came with the Fighting Fantasy book of the same name.

According to World of Spectrum, *The Hobbit* was the first Spectrum game to sell over a million copies, but other sources put that figure closer to 500,000 over its entire lifetime. Either way, at a whopping £14.95, it certainly made a fair profit for the publisher, Melbourne House, and the developer, Beam Software.

Its History

The Hobbit was coded by Veronika Megler and Philip Mitchell, students at the University of Melbourne. Megler and Mitchell were mid-way through their computer science

degree when Megler applied for a part-time programmer position at Melbourne House, a then fledgling publisher.

Megler then brought in Mitchell to help with *The Hobbit* after being asked by Alfred Milgrom, one of the founders of Melbourne House, to write "the greatest adventure game ever". As such, the pair spent an estimated 20 hours per week breaking the components of *The Hobbit* down and creating one of the most intricate game engines of the time.

The Hobbit used a text innovation called Inglish, which was a system Megler created to better allow the player to interact with the game world. Where traditional adventures relied on the verb and noun entry system, such as 'get sword', Inglish let the player enter entire sentences to combine several moves. A famous example was "Ask Gandalf about the curious map, then take sword and kill the troll with it."

Secondly, the use of bright and colourful graphics was an excellent selling point for the game. Although other graphical text adventures existed, they never quite had the same effect as *The Hobbit* in terms of the scenes drawn.

Amazingly, Megler only found out about a decade ago just how successful and how much of a cultural impact *The Hobbit* was on an entire generation. *The Hobbit* and *Penetrator* were the only games she ever wrote and were often credited to Philip Mitchell alone rather than the partnership of Mitchell and Megler.

Did You Know?

- Megler had only ever played one adventure game at the time of writing *The Hobbit*.
- Megler and Mitchell when hired, became employee's number two and three at Melbourne House.
- Megler eventually left Melbourne House after graduating, because she felt she needed a proper job instead of programming games.
- One of her most frustrating things to this day is that there's an assumption that Philip Mitchell must have done most of the programming because she's a woman.

The Good

The closest experience to actually being in the Tolkien world (from an early 80s point of view). Amazingly technical game and great images.

The Bad

Timing some of the portions of the game, waiting in the dungeon etc. Those damn pale bulbous eyes!

Conclusion

The Hobbit soon became the adventure that other games measured themselves against. It was an incredible work of art that many of us will have fond memories of.



▲ The Hobbit on the ZX Spectrum, where adventuring began for some of us



▲ Each image was compressed to save memory on the limited Spectrum



▲ It's not long before those pale bulbous eyes make an appearance

Component Watch

Many pundits have pondered whether we actually want or need wearable tech, but fitness tracking is an obvious area where it could flourish. Here are the best current deals for those with a resolution to keep

If you're hoping to start the New Year by getting a fitness-tracking wearable into your life, you're probably not alone. That means there are plenty of retailers out there looking to grab your attention, and that in turn means discounts aplenty to be found. To try and make things even simpler for you, this week's Component Watch is pulling out some of the best deals and discounts we could find on fitness trackers. Just remember to warm up before you use them.

Deal 1: Milestone Altitude Activity Tracker

RRP: £35 / Deal Price: £22

One of the cheapest activity trackers around, the Milestone Altitude tracks steps taken and distance travelled, and uses them to give you an estimated number of calories burned as well. There are two simple modes – sleep and day – and it also comes with a silent vibrating alarm to gently wake you up in the morning. It's water-resistant for outdoor use, and its app is compatible with iOS 7.0+ and Android 4.3+. Frankly it's a bargain if you want to give wearables a try to see if they suit you.

Where to get it: Kikatek (bit.ly/1006mZ8)



Deal 2: Jawbone UP2 Activity Tracker

RRP: £60 / Deal Price: £40

The Jawbone UP2 activity tracker doesn't go with the psuedo-smartwatch looks of many such devices, indeed it doesn't even have a screen to provide information on the move, instead it makes use of three single-colour LEDs that can be used for notifications and alerts when necessary. It does, however, provide three levels of sleep-tracking included alongside activity tracking (that includes steps, distance, calorie-estimation and more). The smart coach app, which will run on a paired mobile phone, will also help you personalise your training and activity goals so you're always getting the best advice for you! At one-third off, it's a great way to get into fitness tracking, that also offers an upgrade path that means you won't need to change software should you decide you want more functionality.

Where to get it: Currys (bit.ly/10aR7dx)



Deal 3: Acer Liquid Leap Smart Activeband

RRP: £70 / Deal Price: £50

Acer's Liquid Leap smartband includes a 2.4cm touchscreen so you can use it independently of your phone, but it also allows you to operate your phone from the band, including checking your email, controlling your music and triggering your camera. It does both sleep and activity tracking and it's waterproof, so the only time you'll have to remove it is when it's being charged. A great all-rounder, especially at this price.

Where to get it: Expansys (bit.ly/1mG67sz)



Deal 4: FitBit Flex Activity Tracker

RRP: £90 / Deal Price: £68

Fitbit are pretty much the kings of mid-to-high priced activity tracking, and the FitBit Flex remains one of the best examples of its kind. You get a five-LED display which can display progress towards and number of goals, wireless syncing with your phone or other Bluetooth device, sleep tracking and alarms and the usual set of activity stats tracked. The app also allows you to log food and workouts for a complete all-in-one health tracking solution.

Where to get it: Conrad Electronic (bit.ly/1Pf6Yrj)



Deal 5: Mag Echo Smart Running Watch

RRP: £99 / Deal Price: £89

Although it looks like a smart watch, the Mag Echo is really more of a watch-shaped fitness band, since it doesn't run apps – it's all about tracking your movement. It does have a watch mode, but a few presses of a button gets you access to sleep-tracking, step-tracking, distance-tracking and features commonly associated with running watches, like timers and lap counters. Unlike most trackers, this one uses a standard watch battery so you don't have to charge it and can go over six months without needing a replacement!

Where to get it: Ebuyer (bit.ly/1PKvHqn)





CES 2016: AMD Previews Polaris

Listen Up Gamerz! New 'Phones Right Here

AfterShokz releases new wireless set

Headphone brand AfterShokz has announced a new wireless bone conduction headset for gaming on PC, Mac and mobile devices. The Gamez headset looks a little different but promises safety and comfort and the lightweight, open-ear design is quite nice actually.

PremiumPitch Stereo Sound audio promises to give gamers "great" wireless audio for gaming on the go or at home and the firm claims that these are "arguably the

most comfortable gaming headphones on the market". The PremiumPitch inclusion is quite important as it promises to optimise the sound you're getting and additional features like LeakSlayer technology reduce sound leakages to ensure that your audio output is where it should be.

The open ear OpenFit design also promises "uncompromised" situational awareness and comfort while sweat resistance, noise cancelling mics and six hours from a single charge are the other

features worth mentioning. Selling at around \$100, that's around £67 in your British pounds. The website for more details is aftershokz.com.



Zuckerberg Channels His Inner Superhero

AI challenge for Facebook boss

Mark Zuckerberg is a relatively successful guy (okay, he's a frighteningly successful guy). He's also not someone to rest on his laurels. Ever. Indeed, the busy chap has blogged about his next venture: to build a simple AI that will run around his home. In his own words: "You can think of it kind of like Jarvis in Iron Man". Marvellous.

This is the latest in his annual personal challenges and Zuckerberg plans to make an AI capable of

understanding his voice to control everything in his home – music, lights, temperature etc. – and, using facial recognition technology, the AI will let people into the home when they ring the doorbell.

He's doing all this as the theme of this year's challenge is invention and as it's rewarding to build things yourself, he's taking on this frankly pretty cool challenge. We've also built things over the festive period. LEGO sets, granted, but that counts, right?



New GPU architecture

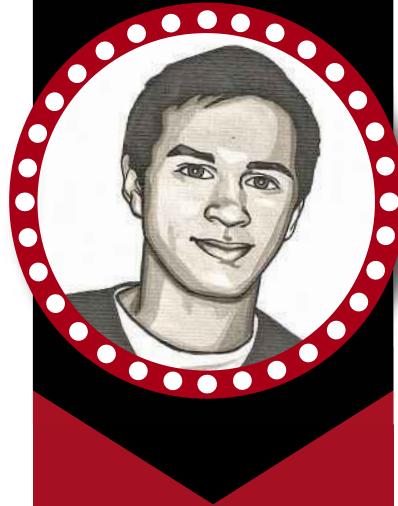
AMD used this year's CES Show to give everyone a wee glimpse of its upcoming Polaris GPU architecture, due to begin shipping in mid-2016.

Polaris architecture-based 14nm FinFET GPUs promise a "generational jump" in power efficiency according to the manufacturer and feature AMD's fourth-generation Graphics Core Next architecture, a next-gen display engine with support for HDMI 2.0a and DisplayPort 1.3.

plus next-gen multimedia features such as 4K h.265 encoding and decoding.

Frankly, the new Polaris technology can't come through soon enough for AMD, which reported a 26% drop in revenues during the third quarter of last year (though that still equated to over a billion dollars going through its tills) and has consistently played second fiddle to Intel in the CPU market recently.

Let's hope Polaris delivers on its promise, then.



When I first heard about Ultra HD Blu-ray, two thoughts came to mind: 'Finally!' and 'Why bother?'

Even though 4K is still an expensive technology, it's been with us for quite a while now, but we're only just seeing a form of hard media that can actually take advantage of it. There's been so little to watch in 4K so far, early adopters pretty much threw away their money.

Thankfully, though, those of you who own or are planning on getting a 4K telly will finally have something to watch. Ultra HD Blu-ray is, of course, one option, but there are streaming services like Netflix already offering an Ultra HD service.

Considering how many people have rejected Blu-ray in favour of such service, it doesn't seem likely that anyone who's already ditched optical discs is going to be tempted back by Ultra HD Blu-ray.

I'm sure there will be a few buyers, of course – those who still like to collect movies in boxes and those who just want something to show off their new 4K TV – but I have my doubts about whether that will be enough to sustain it.

CES 2016: Lenovo Unveils New ThinkPad Portfolio

Modular model in new range

Lenovo's X1 tablet portfolio has been expanded with the new range shown off at this year's CES show in Las Vegas. Chief among the new range is the X1 Tablet, sporting a unique modular design that can offer additional functionality through simple clip-on optional modules, such as a Productivity Mobile increasing battery life up to 15 hours in total, a 3D Imaging Module with a rear-facing Intel RealSense camera, and a Presenter Module that includes a pico projector and HDMI port. The X1 Tablet can also use an accompanying full-size keyboard for an ultra-light laptop experience.

Also in the X1 range, the ThinkPad X1 Yoga is pitched by Lenovo as the world's first convertible

featuring an optional Samsung OLED display, offering rich colours and deeper blacks. A patented Lift and Lock keyboard retracts keys in tablet mode, and an active pen allows for note writing using the Microsoft Edge browser.

For more information on this new series, and a host of related accessories such as headsets and power adapters, head for www.lenovo.com.



Bletchley Campaigner Awarded OBE

New Year's honour for Dr. Sue Black

One of the standouts among the Queen's New Year's Honours list, at least in the technology field, was the Bletchley Park campaigner Dr. Sue Black, who was awarded an OBE in recognition of her services to technology.

Said services include her founding of Techmums, which helps to educate mums on technology, and also her hard work in campaigning for the restoration and preservation of Bletchley Park.

Congratulations, Dr. Black.

Anthony
Editor

Meanwhile... On The Internet...

If you're in the business of looking forward to things that may be of interest in 2016 we would definitely point you in the direction of Werner Herzog's documentary *Lo And Behold Reveries Of The Connected World*. While it may sound strange that the legendary intense filmmaker (tinyurl.com/MMnet96a) behind such movies as *Fitzcarraldo*, *Grizzly Man* and, er... *Bad Lieutenant: Port of Call New Orleans* (which stretches Roger Ebert's assertion that even his celluloid failures are spectacular – though it was a spectacular failure, we suppose) would turn his attention to a subject as amorphous as this, but the film appears to take a philosophical perspective on what the internet means to our modern society, promising to cover "profound and intangible questions regarding the Internet's future" (tinyurl.com/MMnet96b). Don't expect it to be a lighthearted round-up of memes he's enjoyed, as much as a insightful and thought provoking examination of our changing world from a (both literally and metaphorically) unique voice (tinyurl.com/MMnet96c).

One phenomenon that has arisen, for better and (more usually) for worse along with the rise of the internet is the dredging up of early work done by now-famous personalities (tinyurl.com/MMnet96d). Once the reserve of Dennis Norden, Chris Tarrant and the Tabloids, there are now countless listicles of 'Famous Actors In Ads' (Bryan Cranston for Preparation H, anyone? tinyurl.com/MMnet96e) and no stone is left unturned these days in our collective attempt to prove that the world is a harsh, judgemental place that likes to bring down the great and good a peg or two if possible while ignoring the fact that we all have to start somewhere (tinyurl.com/MMnet96f) and that article writers never, ever have embarrassing things they'd never want anyone to read but were important to the development of their skill. Oh no...

Anyhoo, the point of all this pointlessness is that, this is a lesson that John Boyega – he of *Star Wars: The Force Awakens* fame – is learning now that he's one of the most famous faces on the planet all of a sudden after people started spotting him in posters, courtesy of some modelling he did for stock image libraries before he got his big acting break in Joe Cornish's *Attack The Block* (tinyurl.com/MMnet96g). Boyega dealt with Twitter questions about the pics like a true pro, pointing out that he used the money he made to buy new Nike trainers while he was in drama school.

Frankly, he's got nothing to be embarrassed about, especially as he's now too busy being best buds with Harrison Ford (whether Ford likes it or not: tinyurl.com/MMnet96h) and being 'shipped' (tinyurl.com/MMnet96i) with Oscar Isaac's Poe Dameron (tinyurl.com/MMnet96j) these days (whether he likes it or not: tinyurl.com/MMnet96k). If we've learned one thing about the internet in the last decade or three it's that the internet never, ever forgets.

.AVWhy?

Though it's pure viral-bait, we're going to put our hands up in admiration for Mashable's 'Trailer Mix' feature, that re-imagines films we know and love in different genres. While it's transposition of Michael Bay's Transformers into the form of a 1950's monster movie is not that large a stretch of the imagination, it's a visual treat and leaves you in little doubt which version you'd prefer to see on Channel 4 in the near future (tinyurl.com/MMnet96r).

Another thing that the internet has been good for is answering the burning questions you didn't know you needed answering. Reddit's Horse-sized Duck quandry is a classic of its time (tinyurl.com/MMnet96l) and Yahoo! Answers has been entertaining us for years with its crowdsourced solutions to the really pressing issues of the day (tinyurl.com/MMnet96m). With these in mind, here's one for you: if a dog were to wear trousers, how exactly would it wear them?

That was the question posed by Twitterer [@ajaredbkeller](https://twitter.com/ajaredbkeller) (tinyurl.com/MMnet96n), along with a helpful illustration showing two options – first being trousers for all four legs (with the waistband parallel to the ground), and the second being trousers for just the back legs (waistband perpendicular to ground). It sounds like a simple matter (anyone who's watched enough cartoons will instinctively say 'back legs only', we'd wager), but it promptly sent the internet nuts because it boils down to a core quandry: do we alter our conventional understanding of what trousers are to include four-legged creatures, or do four-legged creatures need to be anthropomorphised to fit our concept of trousers (tinyurl.com/MMnet96o)? It's one for the ages, that... but there is one company that has decided what side of the fence it's on (tinyurl.com/MMnet96p)

If you've ever wondered what apps like Periscope and Meerkat are actually for, well it appears that – in the UK at least – the answer is 'watching in hope that someone will fall in a rather large puddle'. How have we come to this conclusion? If, like us, you were party to the interest that surrounded #Drummondpuddlewatch on Twitter and its sister streaming service last week (tinyurl.com/MMnet96q), you'll already know the answer.

Yes, in a you-really-couldn't-make-it-up splash of internet brilliance, at points during Wednesday January 6th there were around 20,000 people watching large puddle situated in Jesmond, Newcastle, presumably in the hope someone was going to get wet (at least that's why we were watching). Luckily for we lost souls who chose to waste an afternoon looking at it, this impromptu body of water – a side-effect of the extensive rain that has caused problems all across the north of the UK – was situated outside the office of marketing agency Drummond Central, the employees of which had been entertaining themselves with the exploits of those trying to traverse it for a few days before one of their number, social media manager Richard Rippon, decided to livestream their view for the world to enjoy.

And we did; we smiled when people turned up with inflatables and surfboards, and we wondered how the people who just walked by oblivious to our prying eyes would feel if they knew they were being watched from offices, cafes, studies and bedrooms across the land. What a time to be alive, eh?



Caption Competition



"When they said my data package was all you can eat, I didn't realise they meant it literally!"

This image from our dreams was the subject of 1394's Caption Competition. You didn't disappoint... You never do:

- **The Duke:** "Just when I thought Amazon Prime couldn't get any better."
- **JayCeeDee:** "They had a Mac Pro for £1.99 on the internet, so I ordered one. This is what I got!"
- **JayCeeDee:** "The new menu bar on the latest Mac."
- **wyliecoyoteuk:** "The new 'gourmet 3D' search function needed some fine tuning, thought Sam."
- **doctoryorkie:** "This is what it will look like when virtual reality finally arrives."
- **JayCeeDee:** "When they said my data package was all you can eat, I didn't realise they meant it literally!"
- **Ondrive:** "I said I wanted a Mac with a big screen, not a screen with a Big Mac!"
- **doctoryorkie:** "Spam, junk and cookie delivery."
- **doctoryorkie:** "No chips. Not interested. Oh hang on..."
- **The VFM Addict:** "Intel diversifies from merely making chips."
- **Ritasueandbobtoo:** "Just Eat! Tempt in new users."
- **Thomas Turnbull:** "I've joined Microsoft's silver service club, this is just one of the benefits."
- **Thomas Turnbull:** "This food app is phenomenal and you get instant delivery."
- **Wudger:** "Who signed up for the OU online sandwich course?"

Thanks for all your entries, and congratulations to our winner, **JayCeeDee who dodged the obvious Mac jokes to come up with** "When they said my data package was all you can eat, I didn't realise they meant it literally!"

If you have something to say about the picture below (come on, you must have), head to the 'Other Stuff' section of our forum (forum.micromart.co.uk), or email us your funnies via caption@micromart.co.uk, remembering to add the issue number to the email subject line.

Uber Makes Milestone

Billionth journey gives out presents

Ride-booking firm Uber has announced a major milestone in its development.

Apparently, its drivers have clocked up a billion rides since the company first started up in 2010 with the billionth trip being made between Hackney and Hoxton on Christmas Eve. In recognition of the achievement, Uber gave the passenger a

year of free rides while the driver wasn't forgotten as they got a holiday in any Uber city. Furthermore, Uber announced that it would be making a donation to the local Hackney charity, the Hackney Pirates.

U B E R

CES 2016: Supercar From Faraday Future

Self-driving looks ahead

CES 2016 was just getting into its stride at the time of writing, and among the early stories was news of a technology-based concept race car from start-up firm Faraday Future. The US-based electric car company gave its concept machine an early preview, although it's worth noting that any actual model won't get an outing as it's not meant for production at all.

The idea behind the FFZERO1 car is that its teardrop shape and aerodynamic design allows air through the car to cool down the batteries, while the on-board

technology shows itself in the form of information projected in front of the driver via a smartphone dock on the steering wheel itself. Will any car based on some of this technology ever see the light of day to challenge the likes of Tesla, though?

In other self-driving news, Nvidia announced in its first keynote presentation the Drive PX2, a "supercomputer" for self-driving cars that sports the same processing power as 150 Macbook Pros, and boasts 12 CPU cores supporting eight teraflops. Volvo is the first to partner with Nvidia in using the Drive PX2.



Snippets!

GoT Most Pirated

TorrentFreak has released its yearly list of the most pirated television shows out there in internet-land, and it's *Game Of Thrones* that was illegally downloaded more than anything else on the web. The long-running fantasy series was downloaded via BitTorrent over 14 million times during 2015, a fact that means the show has been the most downloaded from web pirates for four years in a row. The site has estimated that episodes of the show were downloaded more than twice as many as the next-most popular title on its list *The Walking Dead*. We know Micro Mart turns up in Torrents quite regularly, so I guess we'll give a big shout-out to anyone reading this from a PDF they've grabbed from The Pirate Bay.

Apple's Italian Tax Bill

Apple has said that it will pay €318m in taxes to Italy as settlement to settle a dispute over unpaid contributions. The payment is part of a broader European initiative to look into multinational companies and their tax arrangements across countries in which they operate.

Boxing Day Traffic Up

The leading retailers in the UK have witnessed a 16% year-on-year increase for online traffic on Boxing Day with DIY stores such as Homebase and B&Q having a good time of things as people focused on home improvements. The supermarkets did pretty well too – presumably as people took to the online sales to bag a bargain.

SimilarWeb market insight also noted that two thirds of consumers browsing online shopping websites on Boxing Day used their smartphones. Shopping on the move. It's the future.

AVG Tool Places Users At Risk

Protection software does opposite

AVG's Web TuneUp software is intended to let users defend themselves from some of the web's hidden threats and, as it's a free tool, it's something that a fair amount of users would have installed on to their systems all too willingly. Turns out that it might have been a bad idea. Indeed, the millions of users who did so they didn't know that they were potentially putting their personal data at risk.

The problem, which was picked up by an angry Google security researcher, surrounds the fact that the extension adds a bunch of Javascript APIs to Chrome that, in the researcher's own words, were "broken". As a result, it was possible that a user's web history and personal data could be seen by others online.

The problem has been fixed since the researcher first complained about the issue to AVG, but it's all a little too late for Google's liking.

Oculus Rift To Come With Free Game

Lucky's Tale platformer promises family fun

Will a 3D platformer featuring a cartoon fox be enough to bring consumers to the virtual reality platform Oculus Rift?

We're not sure but *Lucky's Tale*, a 3D platformer for all the family, will be included for free with every headset. Played from a third-person perspective and developed for the virtual reality space by Playful, *Lucky's*

Tale brings virtual reality into play to give a total view of the world of the lead character, Lucky, and see items and tools that wouldn't typically be visible in a conventional 3D gaming environment.

There's a trailer for the game at the Oculus Rift website (oculus.com) and it all looks very harmless and good, if childlike, fun. As it happens, this isn't all that will come with the headset as space-shooter

Eve: Valkyrie will also be provided for free. As for pre-orders, they should have been let loose as of January 6th.



Google Glass Making A Comeback?

FCC filing suggests version 2.0

Just when you thought it was out, they pull it back in. Yes, Google Glass could be alive and kicking after the Federal Communications Commission website posted documents and images showing a new version of the technology.

The orginal version was, of course, apparently put to bed months and months ago,

However, if these documents are as they appear to be then this new version will be foldable with hinges on both sides of the arms so that Glass can be folded away when not in use – much like a normal pair of glasses, then.

Will this latest attempt by Google to get into wearables see the light of day? Who know, but it seems that there could be life in the old tech yet.

Star Trek Creator's Floppy Disks Saved

Data recovery firm sings its own praises

Data recovery specialist DriveSavers has announced that it's managed to recover nearly 200 floppy disks belonging to the late Gene Roddenberry. Yes, THAT Gene Roddenberry, the creator of *Star Trek*.

While the firm was keeping tight-lipped over the content of the disks,

it simply said that they contained documents, lots of documents. It took a team of engineers over three months to develop software that could read the disk content as these were disks used on systems custom-built for Roddenberry, using "special word processing software" that meant modern file reading methods were useless for viewing them.

Steam Clears Up Christmas Slowdown

DoS attack affects services

If you were affected by Steam's PC gaming goodies over the festive period, you weren't alone. Valve has admitted that Christmas Day wasn't a good one for its gaming service with problems on the landing page of its website. Users were also witnessing other account users' details when trying to access their own account

settings and Valve blogged on the matter to clear things up.

It turns out that a DoS attack targeting the Steam Store prevented its server from loading the right pages. The fact that the festive period also saw traffic increase by 2,000 percent during the Steam sale didn't help matters either. Nothing too worrying then, in the end.

PlayStation Network Goes Down

Twitter explodes with fury

Well this all started a bit early, didn't it? 2016 is barely a couple of weeks old and already Sony has found itself in the unenviable position of having to apologise to its legions of online gamers over a mass, apparently global, outage on the PlayStation Network on January 4th.

As is the way with things today, consumers took to Twitter to air their collective ire at the outage. As is also typical, the response was of the "hang on in their guys, we're working it" variety. Sony did also tweet to suggest that PS Plus and PS Now subscriptions, plus video rentals, would be extended to make up for the matter.

And then, the world carried on as normal.

REVIEWS

Asus Chromebit

A computing platform that redefines the definition of small form factor

DETAILS

- Price: £89.99
- Manufacturer: Asus
- Website: goo.gl/dXtFVJ
- Requirements:
HDMI display, USB or
Bluetooth mouse and
keyboard, USB hub,
wireless network



When I told my wife that the Chromebit was a computer, she really thought I'd been on the Christmas sherry again. That's not really surprising, because this device is the size of a decent bar of chocolate, if you remember what size that was before all our confectionery started to shrink uncontrollably.

Removing the easily losable cap from one end reveals an HDMI blade that you can use on any suitable monitor or TV, and at the other end is single USB port that you can use for peripherals if you also own a USB hub.

Power is provided by a small power pack that must be used for the Chromebit to function, and once you've plugged that in and found a suitable mouse and keyboard, you're ready to rock.

Asus was clearly rather paranoid about how this

might attach to a screen, so it provided no less than three ways to connect it. The simplest is to let it stick out at 90°, though the length of

HDMI extension that can hold it vertically. Choice is good but, really, three ways?

As the name strongly hints, this is a Chrome OS

YouTube videos play remarkably smoothly, even if you're running in 1080p resolution. Undoubtedly a factor in that performance is connecting the Chromebit to a decent wi-fi service, and Asus did make this device 802.11ac to enable the best possible options.

I've seen other reviewers criticise this design for having limited storage, as 16GB isn't much for anything these days. But as the point of this OS and device is entirely cloud-based and generally storage is kept away from the user, it's fine.

Perhaps the inclusion of a micro-SD slot in the next release could placate those who might like to carry some documents they can access without internet access.

In short, for those who like Chrome and its minimalist approach to computing, the Chromebit seems almost perfect for the job. However, as I used the Chromebit more, a number of rather obvious design flaws became apparent that Asus probably should address.

Features

- Smallest Chrome OS device, turn any HDMI display into a computer.
- Dual-band a/b/g/n/ac 802.11 wi-fi with Bluetooth 4.0 for fast connections and wireless peripheral compatibility.
- 16GB flash memory storage with easily accessible USB 2.0 slot for expanded storage or wired peripherals.
- Thousands of Chrome OS apps allows for work and play in a portable package.

the device might snag if the port faces directly backwards. There is also a flexible connector that enables the Chromebit to just hang, and there's also a stiff bendable

device, so it's built around a cloud ethic that removes the need for Intel hardware. Inside this gizmo is a 1.8GHz Rockchip 3288-C ARM Cortex derivative SoC, 2GB of RAM and 16GB of eMMC flash storage. This silicon was built specifically for Chrome OS with Google's support and is destined for a selection of new Chromebooks in addition to this device.

That might seem a modest computing platform, but for running a browser it's more than sparkly enough, and generally this a responsive and snappy experience.



The most obvious of these is the single USB port, because there is sufficient room for two ports on this device, and that would negate the need for a USB hub or more expensive Bluetooth peripherals.

Another is the power pack, where Asus missed a really obvious trick not making it a USB cable variety like on phones. Many TVs these days have a USB port for providing power to external drives, and that could have made the Chromebit installation so much neater than it is currently.

These are small things, but I'll sling them out there on the possibility that Asus puts out another version of the Chromebit further down the line.

But – and this is the real problem for this product – you can buy a cheap Chromebook for just £10 more. And you don't need to find a screen, keyboard or mouse to use it.

The advantage the Chromebit has is portability, but once you've filled a bag

with a mouse, keyboard and USB hub, this isn't as remotely as small an ensemble as the physical package of the device itself. And you're assuming there will be an accessible HDMI port on that hotel TV when you get where you're going.

Tiny systems also aren't as exclusive as they once were. Competitors like the Intel Compute Stick and Lenovo's Ideacentre 300 are available, both of which give you the flexibility of Windows 10 for a similar price. You can still run Chrome on them, even if it is the desktop app and not the OS.

I'm drawn to conclude that when the Chromebit was conceptualised this was a really great idea, but in the short period when Asus made that into a finished product, the world moved on, unfortunately. That's a real shame, because in many respects the Chromebit is the purest form of the Chrome mantra we've seen yet, and Asus should be applauded for delivering it.

mm Mark Pickavance

Yummy Chrome OS on a stick



Corsair Katar Gaming Mouse

The simplicity of Corsair's latest gaming mouse wins over Mark

DETAILS

- Price: £28.99
- Manufacturer: Corsair
- Website: goo.gl/lrvPli
- Requirements: Windows 7 or later

Last year, I covered Corsair's Sabre RGB mouse. And while I liked that design, the greater than £50 cost and its lightness prevented me scoring it higher than 7.

Cutting straight to the chase, all those wonderful things about the Sabre I loved have been distilled down into the Katar. But (and I'm still trying to work out in my head exactly why), this mouse is substantially better in almost every respect.

The Katar design ditches the superfluous and instead focuses on what gamers need out of a precision pointing device. Precisely, the combination of a high optical sensitivity, with plenty of available adjustment and comfort for prolonged gaming sessions.

The chosen sensor is one of the highest polling I've yet seen at 8000dpi, though you can easily drop that rate with one of the four programmable keys to something more practical.

As mice go, this is a relatively small one weighing just 85g, though even with my shovel-like



appendages, it nestled perfectly into my palm. The sides use a soft rubberised coating, where the centre section is a subtly textured plastic.

Where some mice take a degree of adjustment, my transition to this design was remarkably swift, once I'd toned the sensitivity down somewhat.

The default settings are the

normal left-and right-click allocations, a clickable scrollwheel and the fourth button is set to cycle through the DPI levels. As you might expect from Corsair, all this is reprogrammable. And using the downloadable Corsair Utility Engine software, you can also define the exact DPI for each of the five levels, and the lift height.

The only aspect of customisation that might disappoint is the lighting options, which are limited to the logo either being illuminated as solid or with a pulse lighting effect. Whichever of those you go with, the logo remains red, because that's the only colour LED this mouse owns.

Katar Gaming Mouse Specifications

- Compact, ultra-light weight design
- 8,000dpi optical sensor
- Zero lag 1,000Hz interface
- Ambidextrous shape
- Four programmable buttons
- On-the-fly DPI tuning

Having used the Katar for some serious gaming over the Christmas period, there are a few minor problems I've noticed with it that I need to relay. They all relate to the button sensitivity, though it's a different issue depending which button I'm referring. The left and right buttons are probably over sensitive, and on occasion I ended up clicking the right one just by the weight of my fingers.

Conversely, the button under the scrollwheel is quite difficult to click, even when I was trying to use it. I'd also remark that it is very easy to accidentally cycle the DPI unintentionally with the placement of the four button.

I should say that none of these problems stopped me enjoying the Katar, and at no point did I want to unplug it and go back to my default pointing device.

Overall, for the money, this is a great gaming mouse for anyone who wants something minimalistic yet remarkably functional.

But it's also one of those pointing devices that can work very well for other uses when your playtime has ended.

mm Mark Pickavance

A mouse that most gamers can afford to love



Hi-Tec Trek Plus Wearable

Our new goal is a beach body for summer, but we could do with some help

DETAILS

- Price: £79.99
- Manufacturer: Hi-Tec
- Website: goo.gl/9DZhIQ
- Requirements: Android 4.3 or later / iOS 7.1 or later



► The charging station fits neatly to the rear and will charge the battery within 90 minutes

goal charts: the number of steps, the time active, the distance in miles, calories burned and the amount of sleep you've had.

Each chart can be tapped to enlarge the data across the week to see what active days you've had, how many calories you've burned up and whether or not you've had 7.5 hours' worth of sleep each night.

The information is, of course, based on the initial data you entered into the Trek app. Your height and weight are detailed at the start and from this the app and Trek Plus sets you some starter goals to become accustomed to.

Naturally, you can change the personal data as you lose weight – or gain it – and you can alter the estimated stride length from within the settings once the app is up and running. Furthermore you can increase the goals as you become fitter over time, giving you more to aim for the following week. And as with most of the modern fitness trackers available, the Trek Plus can publish the data collected to Facebook, or you link to others using the same Trek kit to compare your weekly results.

With the Trek charged and on your wrist, you can quick-tap



► The accompanying Trek app monitors your daily and weekly goals

The new year is a traditional start to the 'new you' change of lifestyle. A time when you can get to shed those extra Christmas pounds and prepare yourself for the summer holiday. More importantly, though, it's about beginning to look after your health, and the Trek Plus can help you achieve those fitness goals.

Wearables are nothing new; ever since the first pedometers appeared, users have been fascinated by long lists of stats generated from their daily stroll to work or wherever. These days, the wearable has evolved into something that can monitor your every slightest detail. These wearables are the new must-have accessory, so Hi-Tec needs to pull something pretty special out of the bag to compete with the likes of Fitbit.

The Hi-Tec Trek Plus is a stylish wearable that sits comfortably on the wrist and, when paired up with your smartphone, via the Hi-Tec Trek app, it will begin to monitor a wealth of personal information such as your heart rate, the number of steps you've walked, the distance covered and the calories burned and even how much sleep you've had over a set period.

On top of all that, it tells the time, date and vibrates when there's an incoming email, phone call or text. The information is presented in a collection of five

twice to the side to activate the touch screen. Swiping across will open up the various icons, settings, time, weather, data and so on. You can even shuttle up and play/pause music via the phone, as well as access the reset and factory reset options.

According to the paperwork, the battery life is supposed to last up to five days. However, in our use, we found that it often lasted through the entire week. If you turn off the notifications and push information such as the current weather and vibration functions, we think it'll stretch another couple of days. Obviously if you're playing with it every five minutes, then it'll discharge pretty quickly.

The Plus is the premium model available from Hi-Tec, with the Go

and Lite models filling the mid-range and entry-level positions. Pricing is around £79.99 for this model, dropping to £49.99 for the Lite model.

The Hi-Tec Trek Plus is a great little wearable. It's a polished, easy-to-use device that ticks all the right boxes and will undoubtedly encourage you to achieve your fitness goals for the coming year.

mm David Hayward

A great fitness wearable that will help forge a healthier you



Steam Link

Streaming games to your TV has never looked so good

DETAILS

- Price: £40
- Manufacturer: Valve
- Website: goo.gl/BM2tbj
- Requirements: A very good host PC with Steam client installed and logged in, wired network is recommended. Spare keyboard, mouse, PC or Steam Controller



With the launch of the Steam Machines it may appear a little difficult to get excited about the new Steam Link, but there's more to this little black box than you'd expect.

Priced at around £40, the Steam Link is the answer to those who don't want to be limited with a Steam Machine's Linux gaming platform and don't want to have to set up a sizeable gaming system in their living room.

Essentially, it's just a device that will stream the contents from your Steam gaming PC, through your home network to the big TV in the living room. And it does the job of streaming everything rather well, but you do need to make sure your hardware – including networking – is up to scratch beforehand.

In terms of design, the Steam Link is an incredibly small rectangle that will slip neatly under your TV among the other entertainment boxes. It measures 88 x 121 x 17mm and houses an Ethernet port, HDMI, power and three USB 2.0 ports. Aside from a slight curve at one end, with the Steam logo on the top, there's nothing much else to tell the

▲ The Steam Link has just enough connectivity to make it good

world what it actually is.

The minimalist design isn't such a bad thing; in fact, we rather liked the subtle black box as it sat hidden within the recesses of the gap between

that's all it needs to run the custom Steam Linux kernel that the machine boots up with.

How it works is very simple. You power the Link up and

When you've chosen the Steam PC to connect to, you'll be given a code to enter in the actual PC – in the Steam client. This will pair the two machines together and start the streaming of the host PC's desktop to the Steam Link.

Naturally, you'll need to run Steam in Big Picture mode, and you'll be reminded to, otherwise you'll also see the other desktop elements of your host PC on the TV in the living room.

From there it's just a case of choosing the game you want from within the Steam client – all from the Steam Link – and playing it.

The host PC still does the hard work of playing your game, of course, with the Steam Link merely providing you with a remote desktop session, albeit one with a seamless control setup. The

66 When run on a wired
network, the Steam Link
was flawless 99

our PS3 and the top of a TV stand shelf. It's one less thing to distract you when everything is powered up.

Internally, the Steam Link has a Marvell DE3005-A1 CPU at its heart, with 4GB of flash and 512MB of memory, together with a Marvell 88W8897 wi-fi chip. It may not sound like much, but

once any updates have been downloaded and installed, you're presented with a basic setup screen asking for the default language. After that, it'll then search your local network for any PCs that are currently running Steam. If it finds one, or more, it'll display the network name of the PC in a selection box.



▲ It's a small, thin and unassuming box, but it's capable of so much more

real bottleneck, though, is the home network.

Although our wired tests, using a gigabit network, were perfect, the wireless test we ran didn't fare too well. Less complex games, such as FTL, Shovel Knight and so on streamed perfectly fine over wi-fi. More complex gaming titles, such as Assassin's Creed: Syndicate and Fallout 4 collapsed before we could even get to the main menu.

However, when run on a wired network, the Steam Link was flawless and showed no signs of lag, despite sections of Steam community complaining bitterly that it does. The main advantage is that you can enjoy the gaming experience on your big TV without having to physically hook up your gaming PC, and the Link does an excellent job of this.

You can opt for using the new Steam Controller with the Steam Link. There are three USB ports, so there's room for some multiplayer gaming too. Any Steam controller updates,

Like many PC gamers, we're a little useless when it comes to playing a fast-paced game with a controller. Give us a keyboard and mouse, though, and we'll be at the top of the

can reap the benefits, and you won't be able to use the host PC for work or anything else while you're busy gaming in the living room either.

But if you have the right kit in place, the Steam Link is £40 well spent.

mm David Hayward

66 There are three USB ports, so there's room for some multiplayer gaming 99

A simple way to access Steam streaming

however, will need to be done through a physical connection on the host PC, but you can skip through the warnings easily enough.

More to the point, you can connect a keyboard and mouse to the Steam Link, and it'll work as well as if you were sat in front of your PC.

leaderboard. Incidentally, you can also control the Link's built-in menu system with the keyboard and mouse as well.

The Steam Link is an extraordinary device. When it works, it's brilliant, but you'll need to invest in a stable and fast network, as well as a decent gaming PC, before you



Cyberpower Steam Machine K

A new generation of living room PC gaming

DETAILS

- Price: £999
- Manufacturer: Cyberpower
- Website: goo.gl/EiMrgC
- Requirements: Steam account, keyboard, mouse, monitor

The highly anticipated Steam Machines are finally here, and gamers can now get their hands on the accumulated technology that Valve and a collective of manufacturers has been busy preparing for us. But was it worth the wait?

With the Steam Link and Steam Controllers now readily available, the Steam Machine concept is designed to bring Valve into the living room and on the TV, with an eye for taking valuable territory from the consoles. PC gaming has taken a lot of flak in recent years, but it's not quite as dead as the critics would have you believe, and its rise again could well be thanks to the efforts of the Steam Machine.

This particular model, from Cyberpower, is a Syber-branded low-profile PC with an MSI Z170I Gaming Pro ITX motherboard, 3.4GHz Intel i7-6700 Skylake processor, 16GB of Corsair Vengeance 2666MHz memory, a 2TB SSHD Seagate drive and SteamOS ready to be logged into.

Graphics come courtesy of an MSI GTX 970 4GB, with a 1102MHz GM204 GPU overclocked to be around 5% faster than the stock 970 speeds, and a boost clock speed of 1241MHz. Outputs on the card include a pair DVI ports, a HDMI and



▲ The Cyberpower Steam Machine K is a fantastic gaming PC

a DisplayPort. It's certainly a capable graphics card, and you'll be able to hit higher graphical details at 1080 without too much difficulty.

This particular model is one of three available Syber Steam Machines – the others

monstrous when in its allotted shelf under a TV. The case is largely plastic, with a glossy finish to the top and a ridged look around the front and sides. Additionally, there's also a set of LED strips that light up the front of the machine,

good, and any gamer would be happy to have this as their system of choice. The possible Achilles heel in the equation is the operating system.

SteamOS has seen a number of updates since it first appeared many months ago, and thanks to Valve and the testing community, this Debian-based Linux distro has seen some advances in terms of its usability and performance. The problem, though, is down to the gaming experience.

Gaming on Linux is good, but it's just not quite as good as gaming on a Windows PC of a similar specification. You can blame the driver developers, the triple-A game developers or anyone else along the way, but the simple fact is that, at the moment at least, you get a better gaming experience on Windows 10 with the Steam client than you do from the Linux-driven SteamOS.

Another point worth considering is that you're locked

66 You may be forgiven for opting to ditch SteamOS and install a copy of Windows 99

being the entry level P-model, the mid-range I-model and of course the top of the line model K. The design across the range doesn't differ, other than the processing power of the internal hardware.

The case measures 351 x 345 x 98.5mm, which makes it slightly bigger than the PS4 and the Xbox One. However, it doesn't look particularly

which can cycle through a range of colours at the press of a button located on the left of the case. And thanks to the use of the MSI motherboard, connectivity is excellent, with plenty of USB 2/3/3.1 ports, optical out, Ethernet and so on.

The PC hardware and the design of the chassis that makes up the Cyberpower Steam Machine is really very



▲ It's one of the best machines we've ever had under our TV

into SteamOS and Steam Big Picture mode. Getting behind those layers is possible, but you're left with a much scaled-down and streamlined Linux distro. For those who know what they're doing, being able to access the internet, stream media across the network and so on won't be too much of a problem, but for the majority of users, you're losing some of the PC's greatest capabilities by being semi-locked down to Steam – plus you won't be able to access Origin or Uplay games either.

There are, of course, considerably more games available for SteamOS within Steam now, and that number

is increasing daily, but until the interaction between the OS and hardware improves, you may be forgiven for opting to ditch SteamOS and install a copy of Windows on the Cyberpower Steam Machine.

Those games from our library that will run on SteamOS, however, performed well enough. The likes of *Bioshock: Infinite* and *Middle Earth: Shadow of Mordor* achieved frame-rates of well over 35fps, but again, we have seen better performance from a similar Windows systems on the same games.

Cyberpower's base configuration of the Steam Machine K puts it at £999,

but you can, through the Cyberpower website, configure the hardware to increase or decrease that price and tweak the performance and setup to your own particular tastes. And there's probably just enough room inside the Steam Machine case to add another drive without it compromising the airflow, should you feel the need to dual-boot into a Windows environment.

Overall, we really liked Cyberpower's Steam Machine K. It's a great performer, looks splendid and achieves the goal of successfully bringing a PC-based console into the living room. Unfortunately,

we're just not sold on SteamOS yet.

mm David Hayward

An excellent PC, but we're not convinced by SteamOS



GROUP TEST

8GB RAM DDR3 Kits

Memory is still one of the bottlenecks to overcome when designing and building a PC, but it's a tricky element to get just right.

If you buy the most expensive RAM available you could be wasting your money, as something cheaper performs just as well. Likewise, if you don't spend enough, then you could end up with something that won't perform the way you want it to.

We have six 8GB DDR3 RAM kits on test this week, so maybe one of them is just what you're looking for.

8GB RAM DDR3 Kits

Corsair Vengeance Pro

DETAILS

- Price: £43
- Manufacturer: Corsair
- Website: goo.gl/XUxAHB
- Requirements: DDR3 slots, 350W PSU
- Product no: CMY8 GX3M2A2400C11R



▲ The Corsair Vengeance Pro RAM kit certainly look the business

► It's great value for money and you get superb performance

Corsair has continually proved itself to be a driving force in the computer RAM market place. Most of the power and gaming system builds you'll come across feature Corsair RAM, purely because of the good value it offers, as well as the quality of the manufacturing process and overclocking abilities.

Designed to work with third- and fourth-generation Intel processors, the Vengeance Pro kits are available in a range of capacities and speeds. From an entry point of 1600MHz through to 3200MHz and available in an assortment of colours, the Vengeance Pro pretty much has something for every type of system builder.

The 8GB kit we're looking at today is the 2 x 4GB DDR3 2400MHz Red version, with a latency of 9-9-9-24 and running at 1.5V.

The Red title is purely for show, it being the colour of the top of the heatsink. While that doesn't have any bearing on how well the memory performs, it is available in blue, silver and gold, so it can match your LED setup, motherboard or whatever else you've installed for a showcase system.

In terms of overclocking potential, we managed to tune the speed up to a tad over 2500MHz on our motherboard, with everything remaining perfectly stable. We imagine that with a better motherboard in

place you could tweak it further, to 2600MHz and beyond, but as we didn't have anything available, we had to make do with our current setup.

Interestingly, the eight-layer PCB of the Vengeance Pro has been designed specifically with overclocking in mind, reducing electrical noise and allowing a great optimisation and timings. In short, overclockers will enjoy fiddling around with the Pro kits to their heart's content and will undoubtedly achieve some pretty impressive results.

The height of the sticks are 44.5mm, so although somewhat big, they aren't the tallest RAM sticks we've ever come across. On the whole, you shouldn't have too much difficulty with the majority of large CPU coolers, but as always, it's best to measure up the clearance before you commit to buying anything.

We used SiSoft Sandra for the memory benchmark, recording a good 31GB/s when not overclocked and managing 34GB/s when overclocked to 2525MHz. How those numbers fair in real world computing terms depends on the rest of your setup. Our gaming tests proved to run well with *Assassin's Creed: Syndicate* and a couple of other choice titles.



The only thing we didn't like about the Vengeance Pro was the fact that the red-coloured aluminium strip on top of the heatsink could be unclipped rather too easily. If you remove the stick from the motherboard without taking care, the clip can come off and perhaps get wedged under the board or dropped. It's a small likelihood but one worth noting.

Overall, we were impressed with the Corsair Vengeance Pro 8GB kit. It's priced at around £43 and offers great performance and good overclocking potential.



Crucial Ballistix Sport

DETAILS

- Price: £35
- Manufacturer: Crucial
- Website: goo.gl/hAoLuC
- Requirements: DDR3 slots, 350W PSU
- Product no: BLS2CP 4G3D1609DS1 S00CEU



▲ Although entry level, the Crucial Ballistix Sport is a good choice of RAM

► It's well priced and offers some good performance too

As with Corsair, there are a vast range of Crucial kits available, all at different speeds and capacities, and named something exciting to entice the buyer and to separate them from the standard Crucial memory kits. However, this time, we have the 8GB DDR3 PC3-12800 1600MHz kit on test, priced at roughly £35, although you could probably find the kit a little cheaper if you shop around.

Crucial has greatly improved the quality of its RAM over the years and, as a result, the current batch of Ballistix – in this case, the Sport range – has an impressive list of technical specifications and manufacturing processes after its name. In this instance, the Sport design we have here is designed for standard desktops. Sport VL, meanwhile, has a low-profile design; Sport XT is much taller and a little faster for gaming builds; and the Sport SODIMM is designed for laptops or other ultra-compact systems.

The Ballistix Sport runs at 1.5V, has a latency of 9-9-9-24 and a clock speed of 1600MHz. It's a mid-range pair of 4GB sticks, so it won't perform quite as well as some of the top-of-the-range and faster kits available. But it isn't as tall, so it's probably

more compatible with a wider range of systems, with it measuring 31.5mm in height.

As this is an entry-level memory kit, it doesn't have quite the same overclocking abilities as some of the other examples we have on test, so

slowdown on the games we were testing, although only on the newer games.

Assassin's Creed: Syndicate worked just as well with this 8GB kit as it did with the more expensive Corsair entry. *Fallout 4*, though, did seem

66 General computing use,
the memory proved to be
stable and adequate 99

overclocking wasn't too successful in this case.

Having said that, the benchmark for the Ballistix Sport managed a decent 23GB/s – not bad for 1600MHz memory considering the general average seems to be around 20 to 21GB/s for this type of RAM. Indeed, most users will never need to dip into the arcane art of overclocking.

In terms of real-world computing, we did see some

to stutter slightly when delivering more intensive scenes. But for general computing use, the memory proved to be stable and adequate.

The Crucial Ballistix Sport 8GB kit is actually pretty good. The Ballistic Sport XT is probably the modern gamer's choice of memory at 1866MHz, although it's less compatible due to its size. And in all honesty, more demanding motherboard



owners will probably opt for the Sport DDR4 RAM kit.

Overall, though, the Ballistix Sport is perfectly capable and a little easier to accommodate than bigger RAM sticks. Plus it's a tad cheaper too.



8GB RAM DDR3 Kits

G.Skill TridentX

DETAILS

- Price: £65
- Manufacturer: G.Skill
- Website: goo.gl/EHtF6h
- Requirements: DDR3 slots, 350W PSU
- Product no: F3-2400C10D-8GTZ
- C10D-8GTZ

Although the likes of Crucial and Corsair seem to dominate the memory market, it's often hard to pick out the other manufacturers among the lines of HyperX, Vengeance Pros and Ballistix. G.Skill, though, does an incredible job of keeping its products in the sights of the system builder, but to do so it offers a little more than the usual brand name.

The G.Skill line of memory ranges from the Value entry level brand, through to the Trident, Pi, Performance, Ares, Sniper, RipJaws and finally to the model we have on test, the top-of-the-range TridentX. As you can imagine, what's on offer here is a dream RAM kit come true for gamers and overclockers.

The 8GB kit consists of a pair of 4GB DDR3 PC3-19200 2400MHz sticks, with a latency of 10-12-12-31 and running at 1.65V. The average price puts this kit at around £65, the most expensive kit we've reviewed so far, but you can search the product number to see if there are any deals currently on offer.

These are quite impressive-looking memory sticks. The TridentX logo is emblazoned across a red-and-black aluminium heat spreader across the memory chips, but the most startling feature is the large red heat spreader fin along the top of the stick. This puts the height of the stick at 55mm, which is pretty tall. However, G.Skill has added the ability to remove the fin by



▲ The G.Skill TridentX is a good memory module, with overclocking potential



▲ It is, however, quite expensive

unscrewing it and sliding it off a groove on the top of the stick, to allow room for bigger CPU coolers. Also, the removal of the fin allows you to fit an alternative cooler for the memory, whether that's water cooling or some form of liquid nitrogen cooling.

The mention of liquid nitrogen is music to an overclocker's ears. The TridentX has been designed to accommodate overclocking and extreme computing. But for the reasons

we've looked at previously (the motherboard we have available), we couldn't entice the TridentX to creep above 2400MHz and remain stable. More capable overclockers with specialist motherboards will most likely fare better than us, though.

Despite our lack of overclocking abilities, the SiSoft Sandra benchmark recorded a score of 32GB/s, which is the fastest we've seen so far. Needless to say, the real world

computing and gaming-tests were conducted without any bandwidth problems or anything else relating to a lack of memory speed.

The G.Skill TridentX is worthy RAM for any system, especially a gaming setup. The height may need looking into, depending on your setup, but the advantage of being able to better fit another cooling solution is certainly a bonus point. It's the most expensive kit we've looked at, though, so unless you have a specific need for the TridentX's talents, you may be better off opting for a cheaper kit with the same clock speed.



Kingston HyperX Savage

DETAILS

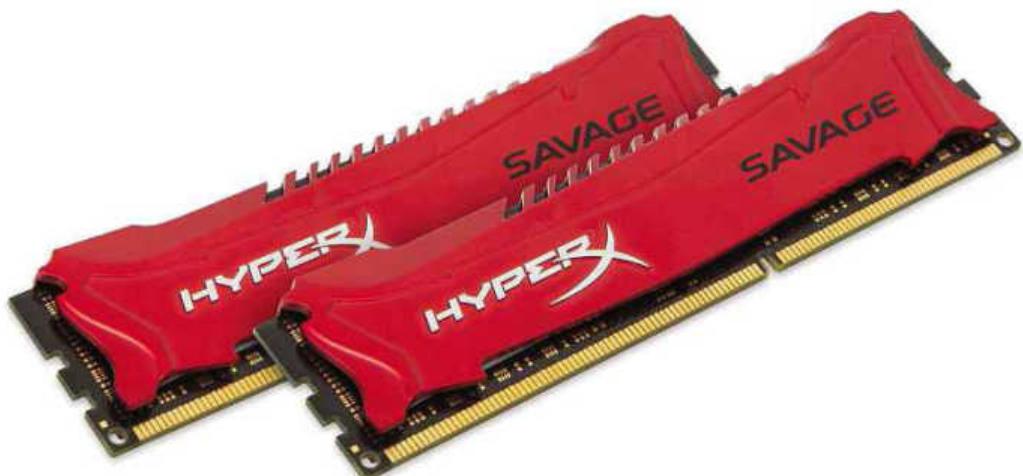
- Price: £44
- Manufacturer: Kingston
- Website: goo.gl/qUjSes
- Requirements: DDR3 slots, 350W PSU
- Product no: HX324 C11SRK2/8

Now, we're looking at the first of two Kingston entries in this week's group test. The HyperX range consists of the Fury, Savage (which we're reviewing here), Predator and Impact. The Fury is the entry-level HyperX memory, with Savage taking the mid-range spot before the high-end DDR3/4 Predator steps in. The Impact is the mobile and small platform SODIMM version, lying somewhere between the Savage and the Predator desktop equivalents.

The HyperX Savage kit we have comes in the form of a pair of 4GB sticks at 2400MHz, with timings of 11-13-14-32 and a voltage of 1.5V. There are various speeds available, from 1600MHz up to this 2400MHz version, the top of the line.

The design of the RAM is quite impressive. Rather than opting for a taller heatsink, Kingston decided on a large red aluminium heat spreader with a saw-like ventilation section midway across the top. Surprisingly, even with the heat spreader installed, the height of each individual stick is only 33mm.

A lot of thought has gone into the look of the memory, so showcase system builders or simply those who like to have matching LEDs and other components will be happy. We particularly liked the black PCB under the red aluminium heatsink; it's a good effect and one we think makes a



▲ Kingston has ticked all the relevant boxes with its HyperX RAM

◀ The Savage performs magnificently and is reasonably priced as well

the usual desktop duties and so on.

The cost of this kit is surprisingly low, considering its speed and overclocking potential. We found the price varied somewhat, but the average was around £44 which, despite making it the second highest in the group, is still pretty good value.

The Kingston HyperX Savage is a great performing 8GB RAM kit. There's plenty to like, and the performance offered is well worth the cost.

66 The Kingston HyperX
Savage kit played every game
without any problems 99

difference for those building a new system.

The SiSoft Sandra benchmark saw a result of 33GB/s with the default settings. After playing around with overclocking, we managed to tweak the HyperX Savage pair to a decent 2535MHz, which upped the benchmark score to 37GB/s.

Admittedly, though, we didn't feel all that comfortable with

the overclock, because after just ten minutes, we could feel the heat from the RAM when just a few inches away from them, so we dropped everything back to its default setting. That's okay, because 2400MHz is enough for most users.

As you can assume, the Kingston HyperX Savage kit played every game without any problems, as well as carrying out



8GB RAM DDR3 Kits

Kingston ValueRAM 8GB Kit

DETAILS

- Price: £30
- Manufacturer: Kingston
- Website: goo.gl/OuZaVN
- Requirements: DDR3 memory slots, 350W PSU
- Product no: KVR16N 11K2/8

The second Kingston entry into this group is the ever faithful ValueRAM kit.

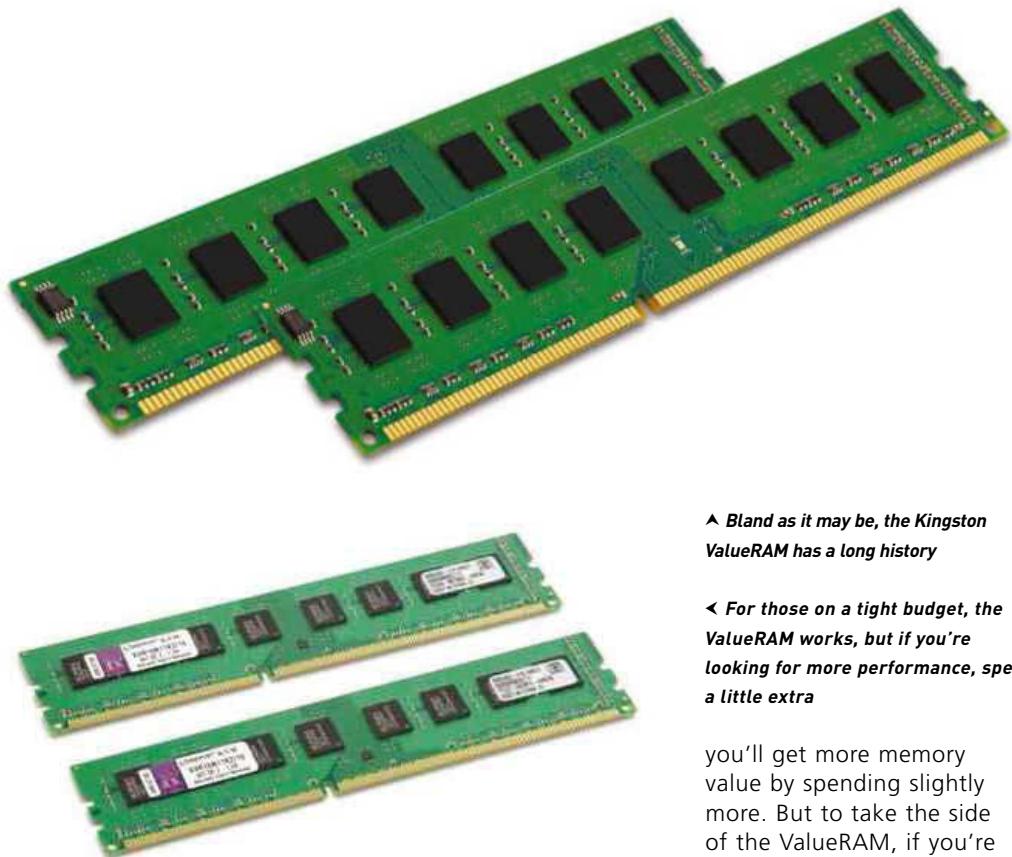
Kingston ValueRAM has been around for years now and still proves to be the stable backbone behind many a standard desktop or company workstation.

The Kingston ValueRAM we have on test here is a pair of 4GB DDR3 PC3-12800, 1600MHz sticks, priced at around £30. The timings/latency for these sticks is 11-11-11-28, with a low voltage of 1.5V.

The sticks themselves look fairly uninspiring; there's no externally mounted cooler or Kingston emblazoned logo fitted to an aluminium front, save for a sticker on the chips. Not that any of that will have an effect on the performance or how the memory works, but it's worth noting that due to a lack of heatsink of some description, overclocking or pushing the RAM beyond its limits is out of the question.

However, despite the lack of visual appeal, the Kingston ValueRAM measures just 30mm from the base of the PCB to the top. This means that it'll fit virtually any system and is low profile enough for even the most aggressively intrusive CPU cooler.

The benchmarks didn't fare too well. SiSoft Sandra recorded 20GB/s, which is the lowest in the group. In real-



world terms, this means you'll more than likely come across some bandwidth problems when playing the latest games or running some memory intensive programs. Our basic gaming tests (since games use huge amount of memory bandwidth) had problems with *Assassin's Creed: Syndicate* and *Elite: Dangerous*. The older titles we tried, *Assassin's Creed IV* and *Civ 4*, didn't have any noticeable problems, though. Basically, if you're not looking to play the latest games but you still favour some of the older titles, the Kingston ValueRAM will be enough to handle the numbers – provided the rest of the system is up to scratch, of course.

As for more everyday computing duties, the ValueRAM worked well enough. The only significant exception was when we loaded up some big images for editing while having a brace of other programs opened at the same time. The ValueRAM took an age to get the image loaded, whereas the higher-end RAM was obviously a lot quicker.

It makes you wonder, though, how much value the Kingston ValueRAM really is these days. At around the £30 mark, the ValueRAM is only £13 pound short of the far better performing Corsair Vengeance Pro or £14 less than the Kingston HyperX. So while it's still the cheapest RAM in the group,

▲ *Bland as it may be, the Kingston ValueRAM has a long history*

◀ *For those on a tight budget, the ValueRAM works, but if you're looking for more performance, spend a little extra*

you'll get more memory value by spending slightly more. But to take the side of the ValueRAM, if you're a company that's upgrading a hundred machines, those few pounds extra make a significant dent in your account.

It's a good kit, though, and if you're on a tight budget, then the Kingston ValueRAM will suffice and offer you a decent and stable chunk of RAM without any fitting hassles or other configuration headaches.



Mushkin Blackline 8GB

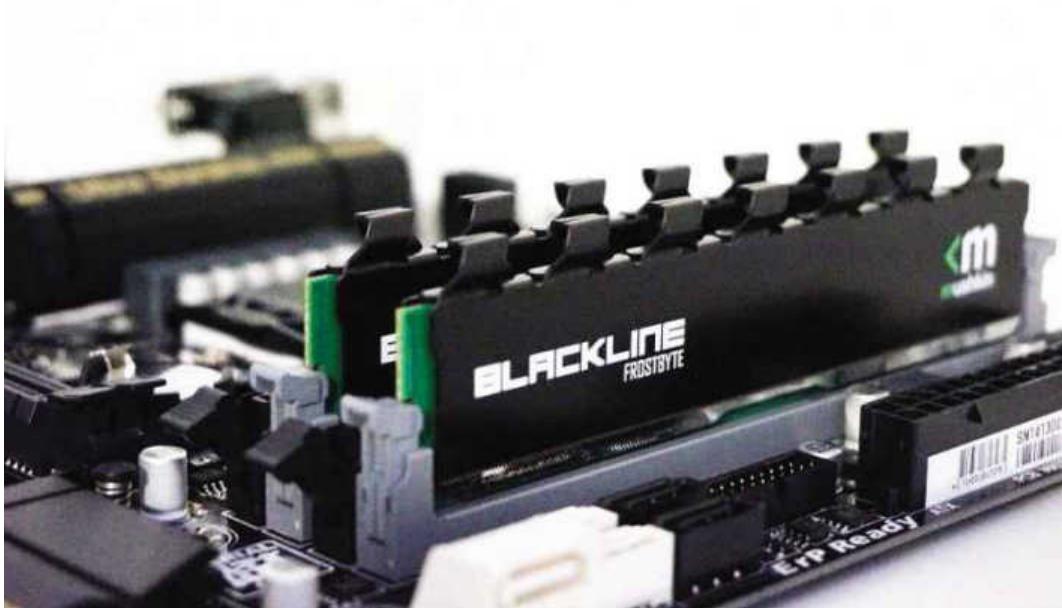
DETAILS

- Price: £35
- Manufacturer: Mushkin
- Website: goo.gl/lXZsTn
- Requirements: DDR3 memory slots, 350W PSU
- Product no: 996995F

Mushkin possibly isn't the first company you think of when you're considering buying RAM, but it's well known among serious gamers and industry professionals.

The Mushkin product range starts with the kit we're looking at for this group, the Blackline. Moving up through the range, though, there's the Radioactive, Redline, Eco2, Stealth, Silverline and Proline. Each has its own set of specifications and is targeted towards a certain type user, but the general feeling of performance branches across all models.

This Blackline kit consists of a pair of 4GB PC3-12800, 1600MHz sticks, costing around £35. The latency is a pretty tight 9-9-9-24, with a voltage of 1.5V. The sticks have an ominous black and serrated heat spreader that's



▲ You might be better off with the more readily available other brand names

66 The heatsink is certainly good, as is the overall design of the module 99

attached separately from the front and rear panels but does an excellent job of dispelling heat away from the chips. The module uses a Frostbyte-G3-B

heatsink that puts the height of the RAM stick at 45mm – just slightly taller than the Corsair Vengeance but smaller than the TridentX.

Overclocking on the Mushkin Blackline went considerably better than some of our previous attempts. We managed to get a stable 1740MHz, which isn't too bad. The SiSoft Sandra benchmark scores were also fairly good with 23GB/s in its default state a decent 28GB/s when overclocked. This puts the Mushkin Blackline kit at around the same speed as the Crucial Ballistix Sport kit, with the option to further improve the system with some clever overclocking.

Although the scores are good, especially when

overclocked, we did experience some gaming instabilities when running at 1740MHz. However, dropping the speed back down to the normal 1600MHz got rid of the problems.

As for everyday use, the Mushkin Blackline kit worked very well. The results were the same as its level partner, the Crucial Ballistix Sport kit.

Considering the cost is the same as the Crucial RAM kit, there's not much to entice the buyer over to the Mushkin brand. The heatsink is certainly good, as is the overall design of the module, but the average buyer will more than likely opt for the more well-known brand of Crucial over Mushkin.



▲ The Mushkin Blackline may not be as well-known here, but it's still good RAM





**EDITOR'S
CHOICE**

**micro
mart**



Kingston HyperX Savage

We felt that the Kingston HyperX Savage 8GB RAM Kit was the best in terms of overall performance, price and ease of use in fitting.

There's plenty of scope for overclocking and with 8GB of these in your system, your computer will be able to handle almost anything you throw at it.



**HIGHLY
COMMENDED**

**micro
mart**



Corsair Vengeance Pro

At only a pound cheaper, the Corsair Vengeance Pro is certainly a worthy RAM kit to invest in.

It's only slightly slower than the winning Kingston kit, but again there's plenty of scope for overclocking and added speed if needed.

How We Tested

Each RAM kit was fitted to a Gigabyte Z97M-DS3H motherboard, with an Intel Core i7-4790K, running Windows 10. We ran the SiSoft Sandra memory benchmark and averaged out the gigabytes per second, along with Assassin's Creed: Syndicate, Elite: Dangerous, Assassin's Creed IV and Civ 4. And for everyday computing duties, we used Firefox, Gimp, Word, Excel and Access – all loaded at the same time.

	Corsair Vengeance Pro	Crucial Ballistix Sport	G.Skill TridentX	Kingston HyperX Savage	Kingston ValueRAM	Mushkin Blackline
Price	£43	£35	£65	£44	£30	£35
Height	44.5mm	31.5mm	55mm	33.3mm	30mm	45mm
Product Number	CMY8GX3M 2A2400C11R	BLS2CP4G3D1 609DS1S00CEU	F3-2400C10D-8GTX	HX324C11SRK2/8	KVR16N11K2/8	996995F
Clock Speed	2400MHz	1600MHz	2400MHz	2400MHz	1600MHz	1600MHz
Latency	9-9-9-24	9-9-9-24	10-12-12-31	11-13-14-32	11-11-11-28	9-9-9-24
Voltage	1.5V	1.5V	1.65V	1.5V	1.5V	1.5V
GB/s Default Speed	31GB/s	23GB/s	32GB/s	33GB/s	20GB/s	23GB/s
GB/s Overclocked	34GB/s	N/A	N/A	37GB/s	N/A	28Gb/s

Top 5

Villains Of Technology

The world would be better place without these...

1 Patent Trolls

No matter where you are in the world, patents are meant to protect inventions, and that includes consumer technology, whether you're talking hardware or software. That's all fine and dandy, and we fully support this notion. The problem is, certain patent offices (particularly the US one) give out patents for just about anything, regardless of their actual merit. That's why Apple can claim it invented slide-to-unlock and why Amazon apparently came up with the idea of photographing things against a white background. And it's also why certain companies exist purely to buy patents and then use them to sue other companies that are seen as infringing them.

2 Trolls

The internet in many ways represents the very essence of modernity – a limitless, superfast source of information. But sadly it also provides an outlet to the most primitive, unsavoury and shameful opinions and behaviour that humankind can come up with. Whether it's racism, sexism, homophobia or people just picking a fight, the act of trolling is something the world could really do without. Slowly but surely, civilisation appears to be reaching the wild west of the World Wide Web, but for our money, it's not happening fast enough.

3 Copyright Lawyers

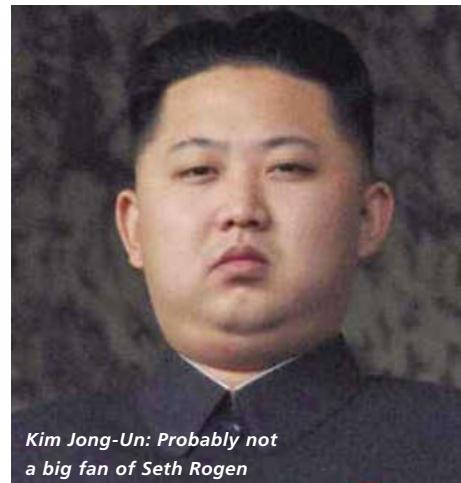
If you've made a movie, written a book or composed a piece of music, then you deserve to have that work protected from thieves. Considering how important copyright is, then, you'd think that the lawyers working in this field would be seen as heroes. Unfortunately, though, we have legal firms like ACS Law and Golden Eye International, which think it's okay to send out letters to normal people, accusing them of illegally downloading copyrighted material. These, of course, demand some exorbitant sum to settle the case, in exchange for not taking the case to court. Apparently, innocent until proven guilty means nothing here.

4 Tax Dodgers

Google, eBay and Amazon: three companies that generate massive yearly turnover. Also, three companies that are renowned for paying a piddly amount of UK corporation tax. But they're not alone. No, the technology world is full of huge firms that use legal loopholes to wriggle out of paying their way, and it's no surprise these kind of companies have become reviled by many normal people. As we all know, however, that hasn't stopped us actually buying stuff from them, and as long as the law allows them to pay so little, we can't see things changing any time soon.

5 North Korea

When you think of North Korea, things that come to mind probably include oppression, starvation and nuclear testing. What you probably don't associate with this Far East nation is a sense of humour – so it probably wasn't a good idea for Sony to release a movie about Seth Rogen and James Franco assassinating Kim Jong-un. Nevertheless, that's what happened, and Sony was then allegedly hacked mercilessly by North Korea in retaliation. Clearly, the powers-that-be in this reclusive nation didn't find anything funny about *The Interview*, which is an odd coincidence, because neither did anyone else.



Kim Jong-Un: Probably not a big fan of Seth Rogen

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Adventures In Text

Part Two: The Keys To The Kingdom

**Leo Maxwell continues with the second part
of his introduction to the Linux command line**

While it's perfectly possible to use Linux without ever employing the CLI, once you get more involved with Linux, you may need to use it to solve a problem or, indeed, you may want to learn it as a way of gaining more control over your computer. It's the powerhouse that the GUI is built on, and it's composed of many small programs, which can be linked together to achieve amazing results.

Last week, we discussed the basics of setting up a test system such as a PC or a Raspberry Pi, but if you have a Linux desktop installed, you can open a terminal from there. You can also run multiple CLI windows side by side. Under Linux, a CLI window is called a terminal, and it can usually be found in the Applications menu under Accessories or in the System menu.

This week, we'll be looking at some common CLI commands. To recap briefly, here are the commands we looked at last week:

- cd = change directory.
- ls = list directory contents.
- pwd = print working directory.
- sudo = temporarily raise privilege to carry out a command as root.
- nano = a user friendly text editor.
- shutdown = pretty obvious really.

More On Sudo And Su

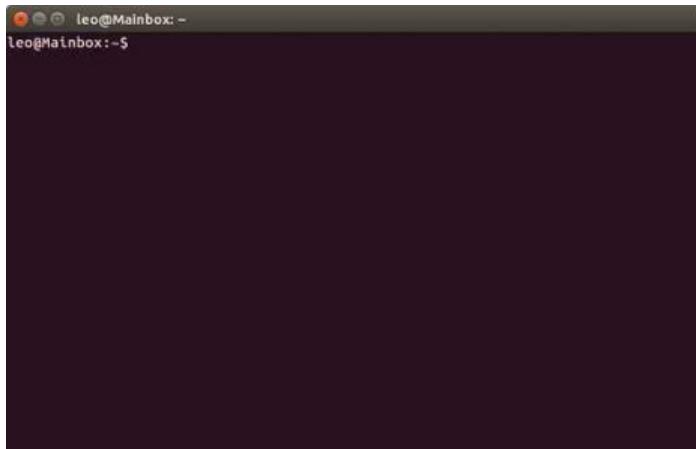
As we saw last week, root is the superuser, the equivalent of the Windows administrator. In Linux, to change any system settings, you will need to have root privileges.

'sudo' lets you temporarily become root to execute a command if you have sudo rights. For example, if you type 'sudo apt-get update', you will be asked for your password, and then the command will be carried out, in this case updating the package database.

'su' lets you assume the identity of another user. For example, typing 'su fred' will ask you for fred's password, and you will effectively become fred.

Typing 'exit' will return you to your own identity.

Some distros, Ubuntu and Debian included, do not have a root user or password as such for security reasons. They rely on the use of sudo, and by default only grant sudo rights to the first user created. You can grant these privileges to other users by adding them to the sudo group.



▲ It may not look like much, but it's the entrance to your operating system's hidden workings

For example, the command 'sudo adduser leo sudo' will add leo to the sudoers group.

In distros that do allow a root user, typing 'su' without a name will ask you for the root password and change your login to the root user.

Unless you really need root access, it's not a good idea to run a session as root, because accidents such as a simple typing error may cause serious damage to the system. There are also other issues; for example, any files or directories created or copied while running commands as root will

“ It's not a good idea to run a session as root, because accidents such as a simple typing error may cause serious damage ”

belong to root by default and will not be accessible to anyone else. Running as root also poses a security risk, as anyone gaining access to a root session has unfettered control of the PC.

You can still run a root session in Ubuntu etc. even though this is not recommended. To do so, type 'sudo su' and enter your password. This will launch a root session, and the symbol behind the cursor will change from a dollar sign (\$) to a hash sign (#). This is to remind you that you are logged in as root.

To leave a root session, type 'exit'.

Files And Folders

You can manipulate files and folders by using many commands, and those that follow are only the most basic. There's plenty of information on the web about syntax.

'cp' (copy) copies a file or directory. So cp file1 file2 will make a copy of file1 and name it file2, while leaving the original file intact. It can be used with various flags and wildcards to copy whole directory structures.

As an example, I have a secondary hard drive mounted at /media/leo/store1. So using the command 'cp -R /home/Documents /media/leo/store1', I can copy the entire contents of my /home/Documents directory and the contents of all of its subdirectories to this hard drive.

Note that any files you create will have you as the owner by default. This is why, if you're logged in as root (or sudo to root), the new files belong to root.

You can preserve ownership, permissions and timestamps by using the -p flag (e.g.

cp -pR /home/Documents /media/leo/store1).

One thing that often puzzles beginners is that Windows filesystems use a different permissions model, so copying from FAT or NTFS disks to Linux or vice versa cannot entirely preserve the file attributes.

'mv' (move) moves a file or directory. In other words, it makes a copy and then deletes the original. It can also be used to rename a file mv file1 file2 in effect renames file1 to file2. It uses similar syntax to cp.

Making It Easier

There are a few tricks that are worth learning to make the command line less of a typing chore.

History

The terminal remembers previously used commands. You can use the up and down arrow keys to scroll through them.

Auto-Completion

This is activated using the tab key and will recognise any valid file, either in the current directory or the command path. For example, typing 'cd /e' and hitting tab will complete to 'cd /etc/'. This may not seem that wonderful, but some filenames can be quite complex. If there's more than one file that shares the same characters, tab will complete up to the point where they diverge.

In sequence, it can save a lot of typing, and avoid mistakes. For instance, 'sudo nano /e<tab>netw<tab>/in<tab>' will produce:

```
sudo nano /etc/network/interfaces
```

Recursion

Many commands can operate recursively on a selection of directories – e.g. copying all files and subdirectories. The recursion flag is commonly -r or -R.

Verbosity

Most commands have a -v flag, which will display results on screen as the program executes. This can be useful to see what's going on when troubleshooting, although sometimes the sheer amount of information displayed can be overwhelming.

Redirection <>

By default, the output of a command is echoed to standard output. Normally this is the screen, but various redirection operators can be used to send the output elsewhere.

'>' will send the output to a file. For example, 'ls > file.txt' will create a file called file.txt containing the output from the ls command. If the file already exists, it will be overwritten.

'ls >> file.txt' will likewise create a file, but if the file already exists, it will append the output to the end of existing content.

Commands obtain input from standard input, which is normally the keyboard, but < can be used to provide input instead (e.g. 'sort < file.txt' will display the above file list sorted alphabetically).

Input and output redirection can be combined. For example, 'sort < file.txt > filesort.txt' will create a new file containing the sorted list.

The pipe symbol (| – usually Shift + backslash) is extremely useful, as it allows the output of one command to be piped to the input of another.

For example, 'dmesg | grep usb' will read the dmesg log (kernel messages) and pipe it to grep; grep will search for instances of 'usb' and show any lines containing it.

```
leo@Mainbox:~$ dmesg | grep Bluetooth
[ 7.238133] Bluetooth: Core ver 2.17
[ 7.238167] Bluetooth: HCI device and connection manager initialized
[ 7.238176] Bluetooth: HCI socket layer initialized
[ 7.238179] Bluetooth: L2CAP socket layer initialized
[ 7.238182] Bluetooth: SCO socket layer initialized
[ 13.338771] Bluetooth: BNEP (Ethernet Emulation) ver 1.3
[ 13.338776] Bluetooth: BNEP filters: protocol multicast
[ 13.338797] Bluetooth: BNEP socket layer initialized
[ 13.346238] Bluetooth: RFCOMM TTY layer initialized
[ 13.346256] Bluetooth: RFCOMM socket layer initialized
[ 13.346269] Bluetooth: RFCOMM ver 1.11
leo@Mainbox:~$
```

▲ The grep results for the word 'Bluetooth' in the kernel messages

This can be a superb diagnostic tool, as most programs save error logs, and if you have an idea of what you're looking for, it can save a lot of time.

Cat

'cat' is a command that becomes extremely useful when used with redirection. Normally it allows you to output the contents of a file to the screen, but used with redirection it can be very versatile.

'cat myfile.txt' would output the contents of myfile.txt to the screen.

'cat > newfile.txt' would create a new file called newfile, containing whatever you type until you press Ctrl+C.

'cat newfile.txt > newfile1.txt' would create a copy of newfile with a different name, or if newfile1.txt already existed, it would overwrite it.

'cat newfile1.txt >> newfile.txt' would append the contents of newfile1.txt to the end of newfile.txt.

Using a pipe to feed it the output from a command:

'ls | cat > listing.txt' would create a file containing the current directory listing, and so on.

Wildcards And Regular Expressions

Complex searches can be achieved using search patterns. The simplest of these are called wildcards. These are used to define a search pattern and rely on the use of metacharacters to set up a search filter. For example, * will match any characters, so 'rm *.txt' will delete all files ending in .txt

? will match a single character, so 'fred.???' will select all files called fred followed by a dot and exactly three characters (e.g. fred.jpg, fred.txt etc.).

More complex searches can be carried out using regular expressions, which involve the same wildcards but also other metacharacters.

More about regular expressions at www.regular-expressions.info.

Copy And Paste

If you're running your terminal on a machine with a GUI desktop, you can save a lot of time by using cut and paste for complicated commands. In most terminals, simply highlight the text with a mouse, right-clicking and selecting copy, or paste a copied line of text, (e.g. from a web page) by right-clicking and using paste. You can also use the keyboard shortcuts Ctrl+Shift+c (to cut) and Ctrl+Shift+v (to paste).

```
leo@Mainbox:~  
leo@Mainbox:~$ sudo lshw -class network  
*-network  
    description: Ethernet interface  
    product: RTL8111/8168/8411 PCI Express Gigabit Ethernet Controller  
    vendor: Realtek Semiconductor Co., Ltd.  
    physical id: 0  
    bus info: pci@0000:01:00.0  
    logical name: eth0  
    version: 06  
    serial: 00:25:22:d1:ef:ad  
    size: 100Mbit/s  
    capacity: 1Gbit/s  
    width: 64 bits  
    clock: 33MHz  
    capabilities: pm MSI pciexpress msix vpd bus_master cap_list ethernet phy  
    physical tp mii 10bt 10bt-fd 100bt 100bt-fd autonegotiation  
    configuration: autonegotiation=on broadcast=yes driver=r8169 driverversion=2.3LK-NAPI duplex=full firmware=r8168e-3.0.0.4 ip=192.168.0.109 latency=0 link=yes multicast=yes port=MII speed=100Mbit/s  
    resources: irq:51 ioremap:e000(size=256) memory:d0004000-d0004fff memory:d0000000-d0003fff  
leo@Mainbox:~$
```

▲ Typical output from the lshw command. This is my network card

'rm' (remove) removes a file or directory (e.g. rm file). It will not work on a directory that contains files unless used with the -R flag, in which case it will remove the directory and all of its contents.

This command illustrates how easy it is to do irreparable damage to the filesystem if logged in as root. 'sudo rm -R *', for example, will wipe the contents of the current directory, all of its subdirectories and their contents. Use this carelessly and you could destroy a large chunk of your system.

'mkdir' (make directory) will create a new directory. For example, 'mkdir /home/leo/newdir' will create a new directory called newdir in /home/leo . You can also set the mode at the same time, using the -m flag as in the chmod command. For instance, 'mkdir -m a=rwx newdir' would create a directory called newdir, with full permissions for all users.

Other Useful Commands

'grep' searches for a text string in a file. Particularly useful when looking for problems in log files. A very powerful tool, it accepts all sorts of options, and regular expressions can be used for sophisticated pattern matching. Usage: grep string filename. For example, 'grep fred /etc/passwd' would search the /etc/password file and display all lines containing the word fred.

'lshw' (list hardware). This command returns a lot of potentially useful information on your PC's hardware. For example, 'sudo lshw -class' network will tell you a lot about your network card.

'tar' is used to create, compress and extract archives for backup. Commonly used to extract downloaded archives for applications, it has many options.

'passwd' is used to create or change passwords. If you have physical access to a PC, this command can be used from a live CD or live USB environment to change any password, even that of root.

'mount' is used to manually mount a filesystem (e.g. when temporarily adding a new hard drive to the system). Used on its own, it will list all currently mounted devices. Permanent mounting requires editing the /etc/fstab file.

fdisk is the Swiss army knife of disk configuration. It allows manipulation and checking of disk partitions.

Managing Users And Groups

There are several commands for managing users, all sharing a largely common syntax:

'useradd' adds a user (e.g. adduser leo will create a user called leo, with a home directory of /home/leo).

'userdel' deletes a user.

'usermod' can be used to modify various attributes associated with a user, such as name, group membership, home directory etc.

'groupadd' adds a group.

'groupdel' deletes a group.

'groupmod' modifies a group's attributes.

'dmesg' lists kernel messages since the last boot and can be very useful in diagnostics.

Scripting

Scripts are text files consisting of multiple commands arranged in a sequential manner, designed to carry out a specific range of tasks.

Essentially, they're small interpreted programs that aggregate other functions.

They range from simple to extremely complex. They may be written using bash commands, but they can also be written in another interpreted language such as Perl or Python.

One of the strengths of the Linux OS is that downloaded files are not executable by default

Permissions

Security is an important part of any operating system, and in Linux, as in Windows, each file can have permissions attached to control who can access a file and what they can do with it. Knowing how to deal with these is an important part of using the CLI, because if you do not have permission to use a command, you can't do much at all.

For example, one of the strengths of the Linux OS is that downloaded files are not executable by default, requiring a user to manually change that setting before it can run. You can always use sudo to run a command as root, but that has disadvantages of its own.

File Permissions

Despite the Linux permissions model being quite simple, it's still flexible enough to match a wide variety of requirements.

User Types

For each file, there are three types of user:

owner = a single user who owns the file, usually (but not always) the person who created it.

group = a single group of users who may have access to a file.

other = everyone else.

Permission Types

The three basic types of permission are:

r = read. Allows viewing of a file.

w = write. Allows modification of a file.

x = execute. Allows execution of a file.

For directories, the permissions look the same, but have different meanings:

r = read. Allows listing of a directory contents.

w = write. Allows creation and deletion of files within a directory.

x = execute allows entering a directory using the cd command.

The ls command is used to list the contents of a directory. The command 'ls -la' might show something like this:

```
leo@Mainbox:~$ ls -la
total 436
drwxr-xr-x  58 leo  leo  4096 Oct 14 21:25 .
drwxr-xr-x  7 root root  4096 Jul 13 21:27 ..
-rw-rw-r--  1 leo  leo   0 Oct  7 17:08 0
drwxrwxr-x  3 leo  leo  4096 Dec 24 2014 .adobe
drwxrwxr-x  3 leo  leo  4096 Jul  1 16:55 .AMD
drwxrwxr-x  3 leo  leo  4096 Feb  9 2015 .audacity-data
drwxrwxr-x  2 leo  leo  4096 Feb  9 2015 audio
-rw-r----- 1 leo  leo  19422 Oct 14 22:10 .bash_history
-rw-r--r--  1 leo  leo  220 Dec 23 2014 .bash_logout
-rw-r--r--  1 leo  leo  3637 Dec 23 2014 .bashrc
drwxr----- 36 leo  leo  4096 Oct  7 16:28 .cache
drwxr----- 3 leo  leo  4096 Dec 23 2014 .comptz
drwxr----- 46 leo  leo  4096 Aug 18 08:43 .config
drwxr----- 3 root root  4096 Jan  4 2015 .dbus
drwxr-xr-x  2 leo  leo  4096 Oct 12 09:08 Desktop
-rw-r--r--  1 leo  leo  25 Dec 23 2014 .dmrc
drwxr-xr-x  41 leo  leo  4096 Oct  9 22:06 Documents
drwxrwx--- 17 leo  leo  4096 Oct  7 15:59 Downloads
drwxr----- 2 leo  leo  4096 Feb 24 2015 .filezilla
drwxr-xr-x  3 leo  leo  4096 Jun 11 2013 .freerdp
drwxr----- 4 leo  leo  4096 Oct 14 21:24 .gconf
drwxr-xr-x  2 leo  leo  4096 Feb  9 2015 .get_iplayer
```

A typical line is:

drwxr-xr-x 2 leo leo 4096 Oct 12 09:08 Desktop

The format for the above listing is as follows:

Column 1 shows the file type and permissions.

Column 2 shows the number of links to the file.

Column 3 shows the name of the owner of the file.

Column 4 shows the name of the group that the file belongs to.

Column 5 shows the filesize in bytes.

Column 6 shows the time that the file was last modified.

Column 7 shows the name of the file.

Let's look a little closer at the first column. The first character is the file type. A hyphen (-) denotes a regular file, d means a directory, and l is a symbolic link (a shortcut to a file somewhere else in the filesystem). The following nine characters represent the file's permissions.

The three types of permission are shown in the order of the user type (i.e. owner, group, other). Missing permissions are shown by a hyphen. For example, 'rwxrwxrwx' would mean full access for everyone. 'rwxr--r--' would mean full access for the owner and read only access to group and others.

Permissions and ownership are managed using the 'chown' and 'chmod' commands.

chown can be used to change both the owner and group ownership of a file. Its usage is chown username:groupname filename. For example, 'chown leo:users somefile.txt' would change the owner to leo and the group to users.

The user or group name are optional. If the user name alone is given, only the owner is changed. If a colon is given with a group after, only the group is changed.

Only superuser accounts can change the owner of a file, meaning the use of sudo or su.

chmod changes the mode of the file. There are four user types:

“ The two forms of permissions management are interchangeable, so you can use whichever you find easiest ”

u = user. The owner of the file.

g = The group related to the file.

o = others (not u or g).

a = all users (u,g and o).

There are three operators:

+ sets mode for type

- clears mode for type

= specifies exact modes for type

The format for applying this command is as follows:

'chmod u+x filename' would add execute permissions to the owner.

'chmod g-w filename' would remove write access for the group.

'chmod a+r filename' would add read and execute permissions for all user types.

'chmod ug=r filename' would set read and execute for owner and group.

chown and chmod can also be used with the -R flag. For example, 'chown -R leo foobar' will make user leo the owner of the directory foobar, all files within it, all subdirectories within it and all of their contents as well.

Octal: Another Way To Use Permissions

In addition to the symbolic method of representing permissions using the rwx characters, which was shown earlier, there is a sort of digital shorthand, which some users find more convenient. Numeric notation, also known as octal notation, uses four numbers to represent the combined modes.

The four basic digits are added together to arrive at a set of permissions represented by a single figure from 0 to 7.

0 = no access

4 = read

2 = write

1 = execute

By adding these, we get the following results:

2+1=3 write+execute

4+1=5 read+execute

4+2=6 read+write

4+2+1=7 read+write+execute

By stringing these together in the order owner, group, other, we get a three-digit number. Some examples:

640 user read/write, group read, others no access.

655 user read/write, group read/execute, others read/execute

777 is known as world access and means full control for everyone.

Playing with PDFs

We look at a few ways in which you can create a PDF without spending a small fortune



The PDF (Portable Document Format) specification has been around since 1993 and has remained the global standard for sharing documents between platforms ever since.

These days we take it for granted, in spite of just how versatile and ingrained into the history of the internet it really is. And with the ability to view a PDF from within any operating system, it can be easy to overlook its importance in the formation of the backbone of the digital age.

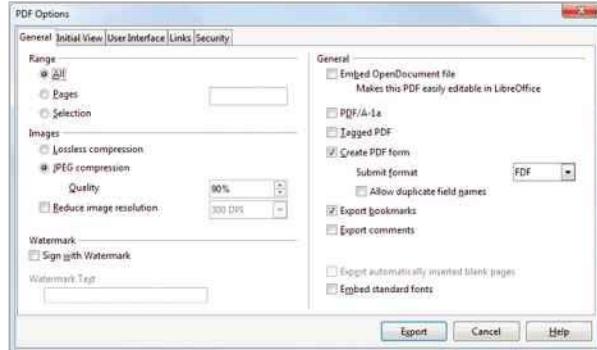
However, while we can all read or view a PDF, how many users actually know how to create one? Naturally, the likes of Adobe Acrobat DC (and its predecessors) offer a far more feature rich experience, but Acrobat DC does cost the best part of £450. For the average home user who simply needs to create a quick PDF to send off to their boss, client or whatever, that's a princely sum to pay. So what alternatives does the home user have at their disposal?

As it happens, there are a number of inventive ways in which you can create a PDF without having to resort to the purchasing of expensive software. You can either opt for the installed route (in other words, using an installed program on your PC, phone or tablet) or you can instead use one of the many online resources available.

Microsoft Office

If you own a version of Office, anything from Office 2007 and beyond, then you can include the option to save a document as a PDF with the 2007 Microsoft Office add-in.

The add-in can be found at goo.gl/p4NUIz and adds export and save-to-PDF options to all the 2007 range of Office programs. Of course, later versions of Office have this built-in.



▲ Of course, using a free office suite is the cheapest solution to creating a PDF



▲ PDFCreator is a decent app – one to look into at least



▲ CutePDF is an excellent choice for those who don't want to go the Adobe route

LibreOffice, Open Office, Etc.

If you're one of the many millions of users who use a different office suite, such as LibreOffice, then you're in luck. By navigating to File > Export as PDF, you can convert the current document to a PDF without the hassle of having to install anything extra. The same goes for OpenOffice and other open-source office suites. In the case of OpenOffice, there's an icon to quickly export the document to PDF, as well as the route outlined previously.

PDFCreator

PDFCreator from PDFForge is a solid and easy to use PDF creation program. It has countless features, some of which are the sort you'd normally find in professional programs, and it's free to download and use.

It's really a converter more than a dedicated creator of PDFs, but essentially, from the point of view of the home user, it can create a PDF from the work you've already written. For more information, head on over to the PDFCreator home page at goo.gl/FMqJPx.

CutePDF

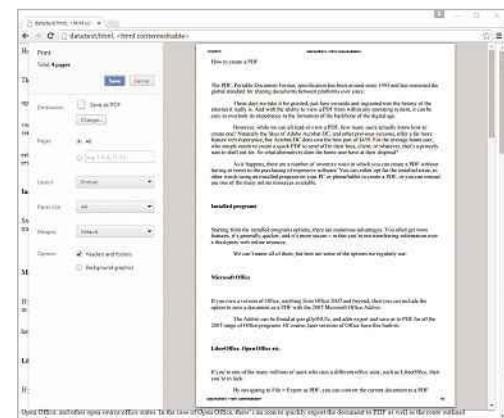
CutePDF, from Acro Software, is one of the classic free programs that has been around for ages. It's stable, comes in several individual solutions and costs very little for the professional version.

Again, from the point of view of the home user, CutePDF Writer may be the best option, as it's free, easy to use and supports Windows 10.

For more info and to get hold of the relevant downloads, visit goo.gl/RQV9ap.



▲ Using Word is a good alternative for creating a PDF



▲ Creating a PDF from within Chrome: an interesting last resort

Xodo PDF Reader & Editor

Xodo is an all-in-one PDF viewer and editor available for Android devices. There are tons of features, and you can create a blank PDF to directly write to and take notes with, as well as use your camera to place images on the PDF.

It's an excellent app and one to consider if you need a PDF while on the go. You can check out its features from the Play store at goo.gl/gwWFvd.

Maker For PDF

Maker for PDF isn't quite as feature laden as Xodo, but it serves the purpose for creating PDFs, and it's a lightweight app for more modestly specified devices.

If you're in need of something without the bells and whistles, then Maker for PDF may be worth looking into. You can find it at goo.gl/pu4Cyz.

OfficeSuite Pro + PDF

If you're looking for a more complete PDF and document creation solution for Android, then for £11.66, OfficeSuite Pro + PDF will tick all the right boxes.

It's one of the most popular and acclaimed office and PDF apps in the Play store, and its features are far too numerous to list here. Suffice to say, it pretty much does everything you could ask for from an office suite.

If you're interested, then take a look at goo.gl/KnS4sr.

Free PDF Converter

Free PDF Converter, found at freepdfconvert.com, allows you to upload a current document or a URL and have the content of it converted to a PDF, PNG, JPG, TIFF or PDF Archive (PDFA).

The service is free, but after the first conversion you'll have to wait half an hour before you can run the process again, and you're limited to ten files per month. However, if you're willing to, you can pay an amount per month (usually \$9) or a lifetime fee of \$99 for a membership that'll give you unrestricted access to the service.

We've never used the member section, so we can't comment on how well the paid-for service works.

PDF Online

PDF Online (goo.gl/JMtPXI) works in much the same way as Free PDF Converter. It'll allow you to upload an already existing file, be that a Word doc, Excel, PowerPoint and so on and convert it to a PDF for free.

It's a handy service, and we've never had any trouble with the PDFs we've created in the past; plus it's remarkably quick too.

Soda PDF

Soda PDF (goo.gl/SvkM8o) offers the user the ability to open, create, convert, edit, annotate and secure a PDF.

It's easy to use and you can even email the finished result to your work or personal account. There's also a browser extension add-on, so you can create and manipulate PDF documents from your browser without having to visit the site.

From Within Chrome

While there are countless PDF conversion tools available for Firefox, Chrome and other browsers, a handy hack we've used in the past is to open Chrome and enter the following into the address bar:

```
data:text/html, <html contenteditable>
```

The page should go blank and you'll be able to type in the main browser window – or copy from another document – after you've clicked in the blank space.

When you're done, click the three horizontal bars in the upper right of the browser and select Print from the menu.

Within the print options, you should have a section labelled 'Destination'. If you click on the Change button below, you can select 'Save as PDF' from the list. When you're ready, click on Save and name your newly created PDF.

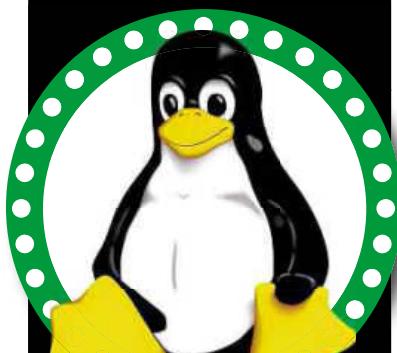
Happy PDF-ing

There are many other options, free programs and online resources available to create a PDF or convert an already existing document to one. We can't list them all here, of course, but we think this selection will keep you happy for a while, at least. [mm](#)

Security

While the online services do a sterling job, there is a concern over security. Most of the online services, especially the ones we've listed here, are conscientious regarding the security of the documents that they process, and they make every effort to ensure your confidentiality.

Unfortunately, though, there are some services that won't care too much. If you're considering converting or creating a confidential PDF using an online service, make sure you read the terms and conditions from the site. If you're unsure about the security of the document and the site, then you're probably best off using the installed program route and keeping everything in-house.



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Some Bad News

Ian Murdock found dead

It's a sad day in the Linux community, with the passing of Ian Murdock, a German-born American software developer who was the founder of the Debian project.

The events surrounding Murdock's death are still somewhat hazy, at the time of writing – we assume that once this edition of Micro Mart is out, there'll be some better clarification about his death. What we can gather, based on what's available in the various new sites across the internet, is that Murdock got into some trouble with the San Francisco police department, where he later took to Twitter and posted several messages accusing the police of mistreatment and abuse.

The messages on Twitter included, "I'm committing suicide tonight.. Do not intervene, as I have many stories to tell and do not want them to die with me...", "The police beat me up and sent me to hospital...", "My career is over now, so I'll be gone soon." And, "ripped off my underwear.. I guess that's not considered rape if you're not a woman being raped..."

Needless to say, they're very disturbing, especially the suicide and rape tweets. The SFPD did acknowledge that Murdock was, indeed, arrested the day before his death, stating that we were yelling outside his home, and that he had earlier tried to break into another residence. According to sources, the police then

state that Murdock became violent when he was put in the back of the police car and was drunk at the scene.

His tweets, after these initial messages, then became more and more irate, lashing out against others and arguing with other members. I don't have the exchange, so I can't comment further on what was said from both parties. However, he then went on to say, "(1/2) The rest of my life will be devoted to fighting against police abuse.. I'm white, I made \$1.4 million last year." And, "(2/2) They are uneducated, bitter, and only interested in power for its own sake. Contact me imurdock@imurdock.com if you can help. -ian."

The tweets become more and more distressing, and only hours after his final tweet, Ian took his own life. The details have not been released, as his family has asked for privacy.

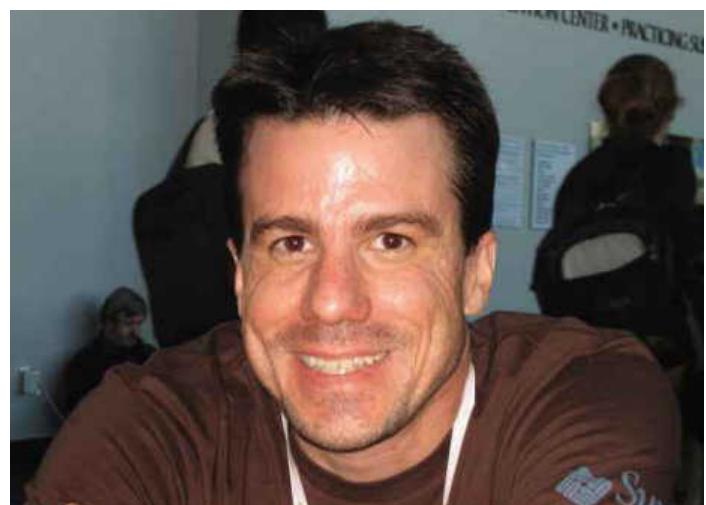
Farewell, Ian

Obviously it's a very sad time for those who knew Ian or worked alongside him at Docker or as a part of Debian. Colleagues have described him as a "stalwart proponent of Free Open Source Software, Father, Son, and the 'ian' in Debian."

Regardless of his behaviour beforehand or the alleged incidents with the police, Ian Murdock was a much revered character in the open-source community. His contributions to open source helped pave the way for a more forward thinking community and software, and he was always helping to push the boundaries of Linux and open-source software with an eye to the future of the OS.

It's never easy reporting bad news, but our thoughts are with Ian's family and friends.

▼ Ian Murdock, the founder of Debian



Exchange Hate

**Think you're being ripped off by Apple's UK pricing?
You're either ingesting tabloid fodder or are from the 1990s**

I recently spotted an asinine article from a well-known British tabloid about how EVIL and NASTY Apple was regarding pricing. On reading the entire thing while holding my nose and vigorously scrubbing myself with a wire brush, I quickly discovered the shock revelation: British people were being horribly ripped off whenever they bought an iMac or an iPhone. In fact, with the iMac, you could apparently fly to the USA, grab a computer from the Apple Store, return home and smugly know you'd still saved yourself some money. Imagine!

Of course, the article in question managed to ignore some fairly hefty practical considerations. First, a typical iMac won't fit into your hand luggage, no matter how hard you try to shove it. Secondly, customs aren't terribly thrilled at people attempting to hot-foot it through 'nothing to declare', when they should in fact very much be declaring a bloody great computer poking out of their backpack. Thirdly, if by some minor miracle, they did make it home with their new and shiny kit, without having splashed out any extra cash, it'd have the wrong plug anyway. And finally, getting to the US and back isn't exactly something you can do quickly – and for many people, time is money.

The writer also managed to gloss over a rather more important point: Apple pricing is mostly no longer 'unfair' when it comes to the UK, and that's especially the case

with more expensive items. Generally speaking, an awful lot of journalists don't mention (either through ignorance or trying to slam Apple) that US pricing omits taxes but British pricing doesn't – and VAT in the UK is a hefty 20%. With a typical Mac, knock off the VAT and do a swift conversion from sterling to US dollars, and you'll find it only costs a few tens of pounds extra in Blighty. For similarly priced items from other manufacturers, you'll find the same kind of 'padding', so this isn't an Apple-specific concern. Tabloids like the aforementioned (albeit nameless) one also don't state this is an issue that's down to government, rather than companies attempting to rip you off at every turn. Classy.

But things weren't always this way. I recall in the 1990s that Apple pricing really was all over the shop. The discrepancy between US and UK pricing was so severe that you really could hop on a plane, head to New York, stay for a weekend in a hotel of the quality where you almost certainly wouldn't be horribly killed during the night, grab a new laptop, take in a show (admittedly, a cheap one), pop home again, grab a US/UK plug adapter, and still have a few quid to spare. Naturally, you still had to dodge customs with your nefarious grey importing, and people took to loading their new Macs up with a few choice documents ("See – it is my actual machine! Yes, I do keep

it in excellent condition!") and mailing back the box via USPS.

Such madness is now in the distant past, fortunately, although on a recent trip to Iceland, I clocked the price of Apple kit there and emitted a tiny yelp. It reminded me of how things used to be in the UK, and was a stark reminder that even when things sometimes turn out fine in your country, that doesn't mean the same's true everywhere. Still, Iceland's not terribly far from the UK, there are plenty of Apple Stores near to Heathrow and Gatwick, and it turns out Royal Mail offers pretty good rates on mailing boxes to Reykjavik.

▼ You might save a few quid buying this in the USA, but good luck fitting it into your hand luggage



Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find Craig on Twitter at @craiggrannell

Mac



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Happy New Gear (Part 1)

2016 is here, and Ian McGurren looks at the new gear at the CES show

A new year means new gear, most of which is revealed at the trade expos that take place early in the year. In fact, with the Christmas decorations barely down, the CES show in glitzy Las Vegas has flung its doors open, showing off all the latest innovations. CES – the Consumer Electronics Show to you and me – isn't strictly the best place for new mobile products, it's more for the AV world, the VR world, the computer world and smaller makers with quirky products. But even though the amount of actual phones and tablets is rather low, mobile integration is a common theme across many of the exhibitors. While previous years may have focused on the rising mobile phone market, and then the tablet market, it seems 2016 may be more about things that interact with your mobile device. Indeed, there's been a long speculated 'Internet of Things' boom bubbling away for some time, partly fuelled by the rise in crowd-backed innovative devices, and partly by companies such as Samsung needing to diversify to pick up the slack from the slowing phone and tablet markets. So many things at CES interact in some way with your mobile device, from TVs to even cars, the tiny screen in your hand is becoming the window on your connected life.

Samsung Family Hub Fridge

Samsung's SmartThings, along with hardware from Belkin and Philips, have been some of the most visible mobile-integrated home automation hardware.

We've had Bluetooth power sockets and wi-fi cameras for a while, but Samsung is packaging it all together under its recognised SMART branding and doing for that kind of hardware what Nest did for thermostats – it's made them slick, cool and easier to understand (though not necessarily cheap). But, as it's Samsung, why release one SMART product when you can release 50? Even if one is possibly the world's most connected fridge. Yes, the Samsung Family Hub refrigerator is the kind of product you saw in the Microsoft Home of the Future 15 years ago, one with a 21.5" high-definition touch screen, a music player, fully connected to the internet, with in-stock checking – so you know if you have milk and when it's off – all operated from your phone, naturally. Oh and it makes things cold too – imagine that?!

Welt

Not really the sexiest of names, but Welt – a clumsy portmanteau of wellness and belt – could be the start of Samsung's smart devices medical side. Currently just a test product, it appears to be a bit like a fitness sensor worn round the waist, so it's able to monitor waist size alongside the usual pedometer and other movements. Of course, that's not a great deal of information, and there's likely to be further interaction with a smartphone, but it shows that the long mooted medical applications for smartphones are starting to appear. However, the ones that will make a real medical difference may still be some time off if they will require lengthy

medical testing and approval. So we may not have a Samsung smart tablet that you swallow just yet, but the Welt shows the directions in which the technology is going, and it may well be looking after us in our old age.

Brillo And Weave

Talking of Internet of Things – and I'm referring to Google's platform now – there was a glut of companies announcing products using the platform's Brillo and Weave IoT operating system. So while the news that a company like comms chip maker Marvell is to make Weave-speaking wi-fi kit doesn't sound exciting, it becomes more interesting when you realise that chip will be in many, many products in the future, and these products will already able to talk to the others in forthcoming Google's IoT-enabled world. It doesn't stop other companies building it in using other ways, though whether Google's IoT stuff and Apple's HomeKit will get on isn't quite so clear.



Technics Resurrects Class Turntable

For Andrew Unsworth, the most surprising tech announcement at CES is not a phone or tablet but a turntable

The annual CES show is happening right now as I type, and it has already brought some surprises, most notably the resurrection of something I thought would remain buried forever: the Technics SL1200 turntable.

The SL1200 was discontinued in 2010 after Panasonic (which owns Technics) decided that the cost of retooling to make more SL1200 units didn't make financial sense given the decline of turntable sales. It probably didn't help that the SL1200 is a design classic and is built to last. Indeed, it isn't uncommon for decades old Technics SL1200s to still be working perfectly today.

The SL1200 was originally designed as a high-end turntable for audiophiles, but it was eventually adopted by DJs due to its rugged nature and the precision of its direct drive motor, which uses magnets to rotate the 1200's platter instead of the belts that commonly drive consumer turntables. Not only could the SL1200 survive the rigours of club use, such as a hot, moist and sticky atmosphere, along with the occasional dowsing in drink, it could also survive the harsh treatment meted out by DJs themselves, who weren't shy in manipulating the platter to scratch and mix records. I'll never forget watching one TV programme when I was a nipper in which one DJ did a spinning handstand on an SL1200 as part of his routine.

The discontinuation of the 1200 seemed final, so I was

therefore astonished to hear that Technics had revealed a new version at CES. In fact, I ignored social media posts about it at first, thinking it was a joke, as there have been many false rumours about the deck's return. This isn't a false rumour, though. The Technics SL1200 is back, but with a twist: it's firmly aimed at audiophiles and has been re-engineered and updated to resolve issues with the original device that prevented audiophiles from loving it.

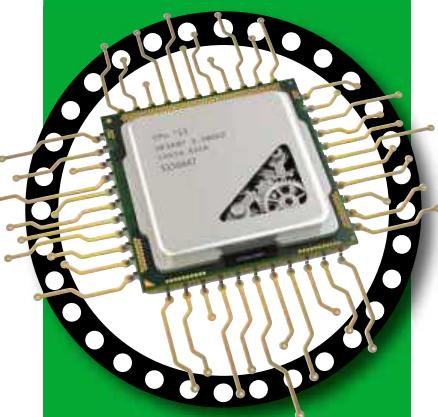
Technics hopes that will change due to new features such as an improved tonearm and a redesigned aluminium platter with a brass weight, the underside of which is covered in rubber to reduce resonance, improve rigidity and reduce vibrations.

Another update is the use of brass-milled and gold-plated phono terminals, which, according to Technics, "prevents degradation in sound quality while enabling the easy attaching and detaching of cables." The quoted text is important because it suggests the phono and

ground cables aren't fixed to the unit, unlike the original SL1200. The fixed cables are the cause of much annoyance for owners of the original 1200s, because if the cable goes bad, you can't just pull the cables out and plug new ones in.

The new SL1200 will be released as a special limited edition model called the SL1200GAE, which is to be followed afterwards by the less special SL1200G. Prices haven't been confirmed, but Technics' latest hi-fi gear has been far from cheap, so the SL1200GAE is likely to be bought by the wealthy, while the SL1200G is likely to be the one that music lovers and DJs can justify buying and using.

No release date has been announced at the present time, but I'm sure that'll come soon, as will prices. Keep your eyes peeled on tinyurl.com/zjhjwsjw for more info. Apologies for no PC-related hardware musings this week, but this is one piece of hardware that I'm sure many DJs will be eager to hook up to their laptop.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Extreme Tech

Specialists



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Gaming



Back To The Future

Explore an alien moon full of lost spirits in the forthcoming indie platformer, *Ghost Song*. It's heavily inspired by *Metroid*, but it also references the rock-hard hit, *Dark Souls*

This week, Ryan takes a look at the 2D platformer *Ghost Song*, and checks out the 90s-style shooters set to arrive on PC soon...

Plug & Play

It's all very well reviving aging genres like the action platformer, but is it possible to make a game in the mould of, say, *Metroid* seem fresh and new? *Ghost Song*, the forthcoming platformer from indie studio Old Moon Games, doesn't necessarily redefine the genre as we know it, but it certainly introduces a modern, fascinating look and feel.

Unashamedly inspired by Nintendo's old *Metroid* series, right down to the armoured protagonist with a blaster arm, *Ghost Song* is nevertheless a smooth and atmospheric-looking game that is far from retro. Sure, it's a side-scrolling 2D game, but its free-roaming environment and light RPG elements are straight out of *Dark Souls* – another game cited as an influence on *Ghost Song*. The game's set on a desolate, lonely moon called Lorian V, a limbo-like alien world populated by the souls of the lost. *Ghost Song*'s armoured protagonist is one such lost soul; a spirit determined to uncover the secrets hidden in the moon's bowels, yet constantly pursued by a mysterious, agile foe...

Brought to life with luminous, hand-drawn graphics – vaguely

akin to the superb *Ori And The Blind Forest*, if you've played that – *Ghost Song*'s 2D presentation appears to hide considerable depth. There's a great-looking combat system with multiple weapons and creepy-looking enemies that react differently depending on where they're struck. Traditional, *Metroid*-style weapons (including a spin attack and a directional gun) are also joined by some imaginative, modifiable alternative moves, including a "ghost dash" which will eventually allow you to suck energy from enemies as you phase through them.

What's remarkable about *Ghost Song* is that it's almost entirely the product of one developer – artist and designer Matt White. The game began life as a relatively modest Flash game, before it evolved into a fully fledged Unity project after a successful Kickstarter campaign in 2013. Since then, White's been quietly but diligently crafting *Ghost Song* piece by piece, and the finished game is finally due to make its appearance in 2016. Given that Nintendo hasn't returned to the traditional action of its seminal *Metroid* series for well over a decade now, *Ghost Song* promises to give fans of that

franchise a new take on familiar mechanics. Far from being a derivative homage, though, *Ghost Song* also has its own atmosphere and ideas. White's cagey about specific beats in his story, but we do know it takes in such themes as isolation, redemption and hope.

We're looking forward to finding out what secrets are tucked away in *Ghost Song*'s eerie-looking landscape, and you can find out more at www.ghostsonggame.com.

Online

If there's an emerging trend to be found in this year's crop of forthcoming shooters, it's this: a back-to-basics approach. Take id Software's *Doom* reboot, which looks perfectly modern but pitches players into a distinctly 90s realm of frenetic blasting and fast-moving, rather dim enemies. Or what about *Strafe*, the competitive shooter described by its creators as "the goriest shooter of 1996"?

With its low-poly graphics and blocky textures, *Strafe* offers up a sci-fi themed shooter that could easily have come from Quake-era id or early Unreal-era Epic. Enemies explode into bouncing cubes of gore and, in a move that might prove a



▲ From indie games like *Strafe* and *Desync* to such big-budget titles as *Doom* and *Shadow Warrior 2*, shooters are going 90s in 2016

bit of a shock to some younger players, your energy won't recharge if you hide behind a wall. In *Strafe*, you die. A lot.

A growing fondness for 90s-style shooters doesn't end with *Strafe*, either. You might recall that 3D Realms' gleefully puerile 1997 blaster *Shadow Warrior* was revived by Polish developer Flying Wild Hog a couple of years ago, with the results proving so successful that a sequel is due out later this year. A generous 15 minute gameplay trailer was unveiled at E3 2015, which showed off *Shadow Warrior 2*'s distinctly modern-looking visuals: hazy light played on the trees and rocks of a traditional Japanese garden. Rusty autumn leaves billowed in soft breeze. For a while, the shuffling characters and blocky map designs of old

are easily forgotten. Then the violence starts, and it feels like the 90s all over again: enemies slashed into bloody pieces by the player's sword or sent packing with a burst of machine gun fire. There's nothing clever or sophisticated about *Shadow Warrior 2*, but therein lies its appeal: its creators don't intend to test our intellects, but rather our reflexes.

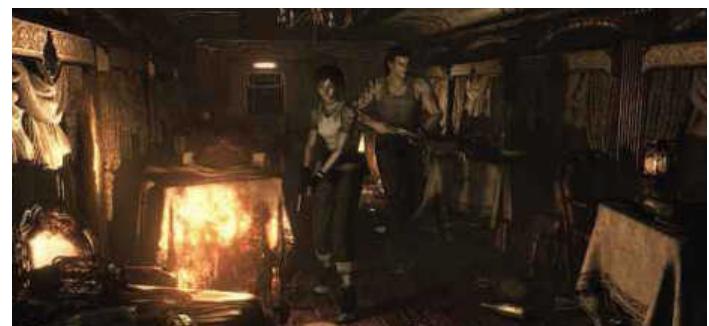
The same can be said of *Desync*, a 90s-style first-person shooter with an aesthetic that could have come straight out of the 1982 Disney film, *Tron*. *Desync* offers up a world of flat polygons and psychedelic colours, where the player blasts away at successive waves of green blobs and armoured humanoids. It looks both retro and weirdly modern; a bit like a cross between

Quake and the hit twin-stick shooter, *Geometry Wars*. The action's fast and aggressive, with enemies assaulting you from all sides; all you have to defend yourself is a pistol and a shotgun. What's more, *Desync*'s programming means enemies are anything but dim: The game keeps a constant track of your movements and skills, meaning it adapts to your play style and also uses that data to judge where you sit on an online leaderboard.

Desync's an example of how developers are using modern processing power to create pared-back, refreshingly direct experiences. While there's no shortage of strategic, brain-boggling games coming out in 2016, there are plenty of titles that will get our adrenaline pumping, too.

Incoming

Capcom's odyssey through its back catalogue continues with *Resident Evil Zero HD*, a reworking of its 2002 prequel first released for the Gamecube. Memorable for its "partner zapping" mechanic, which allowed the player to switch between protagonists Rebecca Chambers and Billy Coen with the tap of a button, the game's been given a fresh lick of paint; environments are now more detailed and atmospheric and you can almost smell the zombies. Those hoping for extra features may be a little disappointed, though; all Capcom's added is an extra outfit for the protagonists – a cheerleader costume for Rebecca, and a Rambo-like gun belt for Billy. Well, it's better than nothing, we suppose. It's out on the 19th January, by the way.



▲ Capcom's survival horror prequel *Resident Evil Zero* is getting a HD remaster

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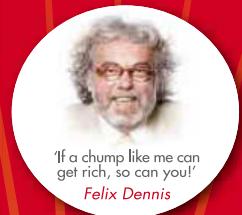
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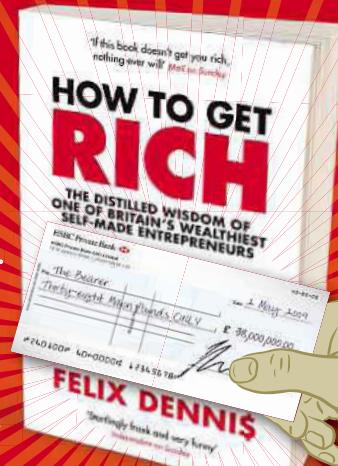
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ISO Magic

Although I'm far from an expert PC user, I've become something of the expert among my group of friends. This means I'm usually the one who helps with problems, and gives advice. Little do they know that I have a knowledgeable friend in the form of *Micro Mart*. So, thanks for helping make me look like I know what I'm talking about. Currently, I have a problem that I could use some help with, and it's the first time I've written in, so I look forward to some actual, personalised advice.

Basically, I have a friend who wants to be able to burn images to discs, and more specifically, create ISO images. I think it's for backup purposes, but he's hardly used a PC, and has come to me for help. I've not had much experience of this personally, but I am aware of it (which is how he heard of it, as I said it may be the best option for his backups).

I would like to help him do this, but would like to give him a solution that would allow further ISO creations without help, so I need a simple, and easy to use option he can use on his own with no fuss.

I've seen a few different ISO creation and burning tools around, but from what I understand, many are often complex, or come filled with bloatware or spyware. I want to avoid this, and would like a program, or any other method that would not suffer from the same issues.

I'd really appreciate your help, and hope you can recommend a program or alternative solution. And thanks again for being my font of all computing knowledge.

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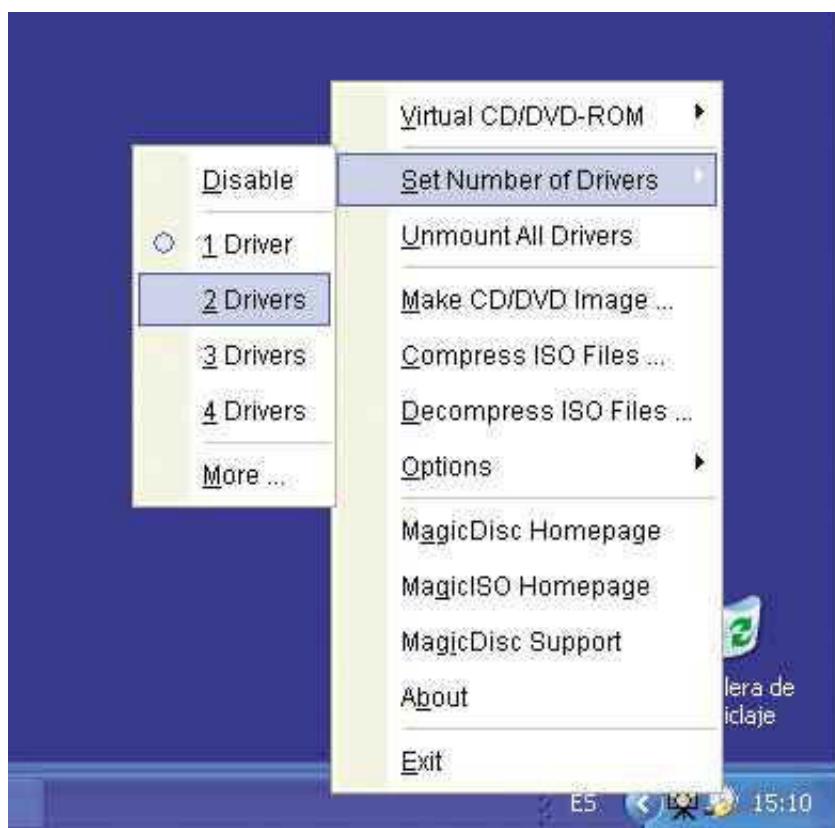
Creating ISO images isn't as difficult as it used to be these days, and there are many options around. As you've said, however, some aren't exactly trustworthy, and you can often find malware, or at the very least other software installs contained within them, so you're right to be cautious.

Usually, if you download software from the bigger download sites like Softpedia, you'll be safe enough, as these sites try to screen out such issues. This isn't guaranteed, though, so don't completely let your guard down. Even the most vigorously monitored sites can let a few issues slip through the net.

*As a specific program recommendation, I'd say one of the best options would be a small program called *MagicDisc*, or *MagicISO* as it's now called. You can download this from many different download sites, or from its homepage of www.magiciso.com. You can still find the *MagicDisc* version from some download sites, and this is the version many people prefer to the updated one.*

The program offers a simple system tray menu that provides you with the option to make an ISO image, as well as mount options to easily allow the use of ISOs once created by yourself or someone else. There are many other options, and the program itself is quite powerful, but the simple task bar menu makes it very easy to use, and should be suitable for your, or more importantly, your friend's needs. It's also free, so will incur no cost, and it comes without any unwelcome guests.

◀ *MagicDisc, or latterly, MagicISO is a great, freeware ISO creation tool*



Speed Test Mess

I've moved from my old ISP to a new one, as I received a much better package from the new company, complete with an increase in speed. At least, that's what I was promised.

The package I opted to go for says it has 20Mb/s speeds, with unlimited data, which is an improvement over my previous 10Mb/s, 300GB setup. It came with a new modem/router, which also seems better than my old one. However, when I started to browse the Internet, I didn't seem to notice much improvement, so I decided to run a speed test. This reported a download speed of 5Mb/s! As I'm now paying for 20Mb/s, I was a little surprised, and just a bit annoyed. I called my ISP and they said they tested the line and ran some other checks, and found no problems. The person I spoke to also said online speed tests are not an accurate measurement of performance at all.

So, I'm apparently left with a connection that doesn't deliver the speeds I've been promised, and my ISP seemingly isn't in a rush to do anything about it. I can't even test the speeds on my own for evidence. What can I do? Do you have any relevant advice?

Graham

When it comes to connection speeds, ISPs are always keen to tout high numbers and impressive statistics, but you have to remember they all advertise speeds prefixed by 'up to'. These two words allow for some major leeway in terms of actual speeds, and it's very unlikely that most, if any, users will get the advertised figure. Basically, the line owned or leased by the ISP is technically capable of such speeds, but in practise, with millions of users and real-world traffic running through the network,

the chances of such speeds are fairly remote. Often you'll get half the advertised figure, or less, as in your case. If you live in a heavily populated area with a high level of activity on the network, speeds can suffer more than users in smaller, less populated areas. Your distance from your local exchange will also have an effect.

That said, 5Mb/s on an up to 20Mb/s line is fairly slow, even with all of these issues taken into account. That, then, brings us to the speed tests.

general range of speeds you'll notice, and this is where speed tests are useful. By using them you can determine a rough estimate of your speed, especially if you run them at different times to get an overall profile. For example, you'll likely get higher speeds in the middle of the day than at night during prime time use.

Using one speed test is often counterproductive, and for the best results, I'd suggest you run a few different tests. Experts debate which type of test works

Online speed tests are hard to really measure in terms of accuracy, as they're third party services

Online speed tests are hard to really measure in terms of accuracy, as they're third party services often removed from the ISP you're checking. They're online tests that focus on download and uploads speeds, but cannot really take into account your local network load, and other issues specific to your ISP and physical setup. They're a very basic measurement, and little more. Even tests operated by ISPs themselves aren't ideal, but they can still be useful, even if they're not infallible.

I wouldn't go as far as to say speed tests aren't accurate at all, though, as the ISP customer service operator said, but I would agree that you shouldn't take a speed test result as gospel. This is demonstrated easily by running the same test a few times. You'll likely get different results, as they're affected by Internet traffic. However, there should be some

better, and tests using HTML5, Flash, and Java vary in accuracy. By using a range of tests, you can get a bigger perspective.

Although by no means definitive, I'd recommend the following tests, which are often considered the best by users.

- Ookla SpeedTest (www.speedtest.net)
- Speakeasy ([www.speakeeasy.net](http://www.speakeasy.net))
- Testmy.net (testmy.net)
- Toast.net (performance.toast.net)

Alongside these, I'd also run the test supplied by your own ISP. With all of these results, you should be able to get a more accurate measurement of your connection and see if you really are getting such slow speeds.

If this is the case, you should contact your ISP again and state that you're not happy with your line speed. There may be a local issue affecting you, or you may even have a fault in your home. The only way to tell is to let an engineer investigate. If it's compatible, I'd also suggest you try your old router. This will eliminate any possible issues generated by the new router.

You should also consider traffic-shaping. As you've just moved to the new service, this probably won't be a problem, as you probably won't have downloaded enough to trigger any fair use rules, but it's worth investigating, just in case. Have you downloaded a lot lately? Does your ISP shape traffic at peak times? Again, ask your ISP to check. You never know.

◀ Speed test are not always perfect, but they can still provide useful information



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Spec Check

I'm in the market for a gaming laptop with a 1080p screen and a mid-range graphics card. I've found a few in my price range – £750 or so – using the 2GB GeForce GTX 860M. However, I think you wrote a while back that this was best avoided, as the 4GB version used a much faster GPU. This version now seems thin on the ground, though, or else it adds a nasty premium to the price. Exactly how much worse is the 2GB version? Would it still be fast enough?

John, Nottinghamshire

As you say, the 2GB and 4GB variants of the 860M are entirely different. On paper, as shown in the table I've put together, the 4GB model should blow the 2GB model apart, and you're right that I've previously said as much in these very pages (December 2014). True, it's clocked 22% slower (taking the lowest speeds in the ranges) and uses an older architecture (Kepler versus Maxwell), but it packs 80% more shaders. Look at the GFLOPS score – over 51% higher.

Cast your eyes over this comparison, though: goo.gl/lqPg7X. It's in Russian, which of course can be easily translated (especially in Chrome), but the numbers are the same in any language. Amazingly, the 4GB card comes second. Only just, and in some tests it pulls away, but overall the 2GB card is faster.

I was so staggered by this result when I first read it that, when the opportunity arose, I ran some tests of my own. These were with a 4GB 860M and a 4GB 960M. You'll see that the 960M uses the same GPU in both 2GB and 4GB guises, and really it's just a rebadged Maxwell 860M with slightly bumped clocks. And, yes, it won the race. The tortoise beat the hare.

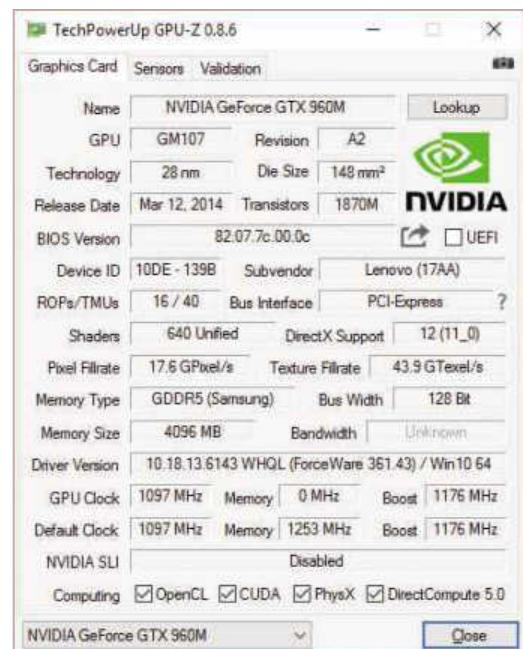
I don't understand it, John. Maxwell isn't so much different to Kepler that it should be able to overcome a colossal shortfall in shaders, but somehow it does. This proves the point, I guess, that you can't rely on specifications alone – it's essential to see how things perform

in the real world. My old advice to give the 'inferior' 2GB 860M a miss wasn't accurate.

In summary, don't worry at all if you can't now find a laptop with the 4GB 860M. Why not find one with the 960M, though? It shouldn't increase the price and it's the best of the lot (I can't explain why it's such a gas guzzler compared to the virtually identical 2GB 860M, however). Should you worry about 4GB over 2GB? Well, go for 4GB if possible, but you're unlikely to find 2GB limiting at 1080p and the kind of settings you'll be using.

PS – Performance of all the above options is broadly the same as that of the desktop GTX 750 Ti (a very good card for mainstream 1080p gaming). Indeed, the 2GB 860M and the 960M are just the 750 Ti with a different name.

▼ **GPU-Z (<https://goo.gl/u486mN>) is a great little tool for discovering the speeds and feeds of your graphics card**



COMPARISON OF GEFORCE GTX 860M/960M MOBILE GPUs

Spec	GTX 860M 2GB	GTX 860M 4GB	GTX 960M 2GB/4GB
Core	GM107 (Maxwell)	GK104 (Kepler)	GM107 (Maxwell)
Shaders:TMUs:ROPs	640:40:16	1,152:96:16	640:40:16
Core Clock	1,020–1,085MHz	797–915MHz	1,097–1,176MHz
GDDR5 Clock	5,000MT/s	5,000MT/s	5,000MT/s
GDDR5 Bus	128-bit	128-bit	128-bit
GFLOPS (32-bit)	1,389	2,108	1,403
DirectX	12.0	11.x (orig.)/12.0 (now)	12.0
TDP	40–45W	75W	65W

▲ More numbers than Countdown

Brought To Book

Do you know if it's possible to obtain some sort of scanner capable of scanning books?

Richard Chamberlain, Gmail

An interesting question, Richard. Thanks for writing in. A book can be scanned using a standard flatbed scanner, of course, but the snag is that the spine has to be strained to get the pages flat. At the very least that spoils the book, but for old or valuable books it could be catastrophic. Another issue is that the pages never really do become flat, so the scans end up with shadows and distorted text.

You could use an old-skool handheld scanner. You'd pass this slowly over each page. From my experience, the results would be pretty poor, though, and by page 40 your arm would drop off. Another option would be to take a digital photo of each page. Fairly quick, but half the pages would likely be out of focus or swathed in uneven lighting. The text wouldn't be editable or searchable either – with actual scans, it would be.

The proper way to scan a book is with a specialised device purpose-made for the job. The book is usually placed face up, open at a regular reading angle (a V shape), and scanned from above. Typically, the pages are turned manually, but automated solutions are available for bulk scanning (such as for libraries or Project Gutenberg – www.gutenberg.org).

Such scanners aren't aimed at home users. One of the biggest makers is Image Access, and even the 'budget' Click Mini weighs in at over \$5,000. Here's the price list: goo.gl/nkSaM8. The prohibitive costs spur some folks into taking the DIY route – see www.diybookscanner.org. Another guide with lots of DIY help can be found on the FLOSS Manuals site: goo.gl/F9ISy4.

In the end, Richard, I suppose it comes down to how many books you want to scan (remember about copyright and all that) and how professional the results need to be. For a one-off job, consider outsourcing – posting the book off and letting someone else do all the heavy lifting. Top of my Google search is www.storetec.net (a British outfit), but there are numerous others. Prices aren't given, which probably means you'll need deep pockets.

▼ You probably won't find one of these at Argos



On The Wrong Track?

Following a recommendation in another magazine, I've set up Apps Tracker (www.theappstracker.com) on my son's laptop (Windows 10). It's meant to log all websites he visits, take periodic screenshots, and limit the time spent on individual programs.

I'm struggling to get it to work properly, though. The time limits I set don't seem to kick in, and I've been unable to set any limits at all for Facebook, Twitter, and so on. The logs aren't accurate either – apparently my son played Lego Jurassic World for only nine minutes yesterday, for instance, yet he was on it for hours. What am I doing wrong? How should I configure the program?

M. Abbot, Gmail

I'd not heard of Apps Tracker, so I've just installed it. And rather wish I hadn't. My word, what a load of rubbish. Like you, I'm running it under Windows 10, so maybe it's better under, say, Windows 7. I can't see it, though. The interface is pretty good – assuming it was designed by an eleven-year-old in his first ICT lesson. During the program's installation, I even got a SmartScreen warning. Microsoft

reckoned the program might be unsafe. A false positive, probably, but not a good start.

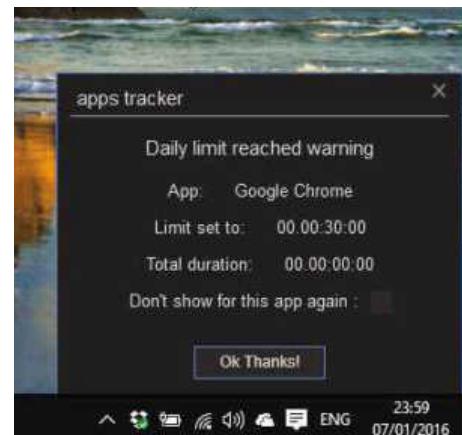
I don't think you're doing anything wrong. My logs are all over the place too. Also, I've set a 30-minute time-out for Word, yet in twelve hours of usage there have been just two alerts. It's not possible to limit the likes of Facebook, as they're not stand-alone programs, but there's the potential to limit browser usage. At least in theory. I've set another 30-minute time-out for Chrome and have enjoyed even less success than with Word.

By default, the time-outs are mere pop-ups. They can simply be closed – the programs keep on running. What's the point of that? The settings can be changed to actually close the programs down, but couldn't this cause work or research to be lost? Besides, I've never got this option to function. I'm not even sure it *can* function, not under normal circumstances. Also, while a password can be set to block access to Apps Tracker's settings, there's nothing stopping a user from just shutting the thing down or uninstalling it altogether.

There must be better tools than this, surely? Help us out here, dear readers! In my view, anyway, such tools are a bad idea. We all

want to keep children safe, but children need privacy and have a right to explore the world around them and discover who they are without being spied on by adults. Knowing that every website is being logged and that conversations with friends are being captured in screenshots – won't this stifle natural development? That's just my view, of course – I'm not sitting in judgement. What do other readers think?

▼ What's the point?



Crowdfunding Corner

Our first proper column of the New Year sees us looking at two very different projects that are both cutting-edge in their own ways: a smartwatch for kids, and a USB-C port hub

Dokiwatch

Introducing children to technology is an important part of their personal and social development, so ideally you want a way to do it safely, cheaply and reliably. And if you're looking for a child-friendly Smartwatch, the dokiWatch fits all those criteria.

Aimed at children aged 6-12, the dokiWatch is a 3G-enabled device with voice-calling, video-calling and SMS messaging capabilities. Features include a GPS tracker, a fitness-tracking electronic pet and more besides. There's even an "emergency mode" which transmits a recording of your child's voice and any background noise to help you locate them if they get lost, or even just wander out of a previously geofenced area.

The device can be managed remotely from your phone, so you can activate and deactivate it, and monitor various types of activity. It comes in four colours – yellow, red, blue and grey – and can be customised with charms that can be purchased separately.

The initial run is only available in limited numbers, so if you want one you'll have to act fast. Choose the colour you want for \$149 (£100) and you'll get two free charms so your child can start customising their watch too. Shipping is due in May 2016, and the project's target of \$20,000 was surpassed long ago, so one way or another it's going ahead.

URL: [kck.st/1PKjZMg](https://www.kickstarter.com/projects/1pkjzm/dokiwatch-a-smartwatch-for-kids)

Funding Ends: Friday, February 5th 2016

CUSTOMIZE

Colors

dokiWatch comes in a variety of cool and trendy colors including Mango Yellow, Dazzle Pink, Sonic Blue, and Shark Grey.

Mango Yellow Razzle Red Sonic Blue Shark Grey

OLink

If you've got a USB-C port but nothing to take advantage of it, then maybe this will help you make the most of your new technology. OLink is a fast-charging USB-C multiport adaptor which uses the latest USB standard to fast-charge multiple devices at once, allow lots of extra USB connections, and allow you to access other built-in features.

The OLink contains a number of ports: three USB 3.0 ports for charging or connecting standard USB devices, an SD 4.0 memory card slot, an HDMI 4K-compatible output slot, and a USB-C power-in port so you can charge whatever device the OLink is connected to.

As good as this project looks, we're a little sceptical of its goal, which is a huge \$100,000. Considering the offers allow you to potentially pick up an OLink for as little as \$59 (£40) using the early bird pricing, with the device intended to retail at \$69 (£47), it's going to have to be very popular to hit that. For both price points, the version with an SD-reader is \$10 more. If it hits its goal – and with 20 days left and \$90,000 still to clock up, we have to admit that's a big "if" – you can expect devices to ship in February 2016 (for the cheap version) or April 2016 for the SD-card enabled version.

URL: [kck.st/1Pf10Xp](https://www.kickstarter.com/projects/1pf10xp/olink-a-usb-c-multiport-adaptor)

Funding Ends: Monday, January 25th 2016



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

(Offtime)

We take a moment out this week and disconnect from the hyper-connectivity of the modern world

It's a funny thing, this modern, ever-connected lifestyle. In the past you never saw queues of people standing outside phoneboxes or rushing to get to the nearest computer in order to see what someone they barely knew had for breakfast. It's all a bit too much sometimes.

The new year is a time to detox from the excess of Christmas. To go 'dry' for a while and take stock of what's going on in your life and with your health. So why not include a digital detox and take time to switch off in 2016?

Time For Offtime

Thankfully an app from Berlin-based Offtime studios, a young post-tech startup, has a solution for all you constantly connected types out there, which can help you take a step back and unhook.

Offtime is all about taking a moment in your life to simply disconnect, but only

slightly, from the ever mobile world around us – to create, as Offtime puts it, "bespoke bubbles of time and space", where you are at ease and in control of the information and communications that are flowing to you.

It's actually not a bad concept. By using the app, you get to create different profiles that can effectively block texts, calls and notifications from distracting you. Likewise, you're able to restrict certain other apps from communicating with you or alerting you if something has happened.

Moreover, you can do all of this but allow only specific people who are important to you to communicate with you. So while ever needy co-workers are blocked, your children or spouse can get through.

Being blocked isn't quite as bad as it sounds either. When you block a contact, the app will reply with a friendly message informing the caller that you're off the grid, and when you're back, an equally

Features At A Glance

- Block calls, texts and notifications.
- Calls and texts from VIP contacts remain unblocked.
- Send out custom auto-replies.
- Comprehensive list of missed phone activity.
- Restrict your access to apps and internet.
- Use Profiles, Schedule and Auto-Start with your Calendar and use Widgets for fast access.
- Get phone and app usage analytics.

friendly message will inform those people that you're now available. There's even an activity log for you to browse through to see what you've missed while you had the Do Not Disturb sign up on your device.

Added to the above is the ability to set Offtime to a schedule, to keep to a 'me-time' calendar. And the analytics tool included will give you insights into your phone and app usage, to help you better identify your communication habits.

All in all, Offtime is designed to help you customise your connectivity and to help you find a balance between communication and private time.

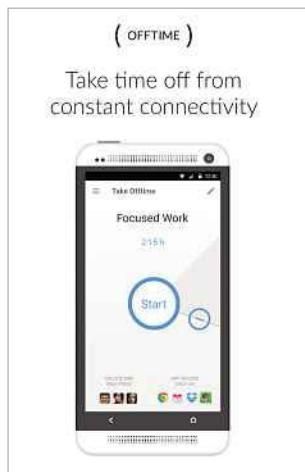
Conclusion

As good as all this sounds, you could just do what we do and switch the thing off. However, that would mean not having access to social media or some other communication with the outside world.

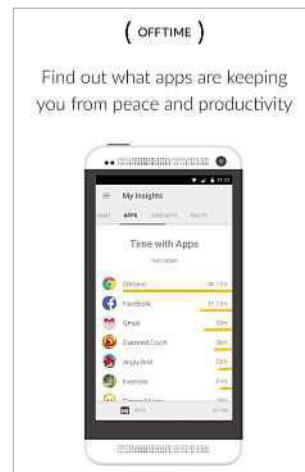
Amazing as it sounds, there are many people who need an app such as this to help them find the right levels of communication and non-communication, to allow them to unplug and disconnect from the digital world for even a brief moment in the day. For them, Offtime is the app to get.



▲ Take time out and become disconnected, for a change



▲ You can set the times you want to be connected and the times for a bit of peace



▲ Find out which apps take up your valuable time

Logging Off

Early in December, one of the weird things, among many, that Donald Trump said was a statement about how he'd talk to Bill Gates about turning bits of the internet off.

Not only did this reveal the gaping chasm of understanding in his mind about the world of technology, but also what role in it some people play.

Calling Gates about the internet would be like getting Stephen Hawking to call the national lottery, because he's good with numbers.

Maybe someone should tell Mr Trump that Bill Gates isn't the go-to guy for your internet issues, in case through a remarkably perverse outcome he actually becomes president.

Yet Trump isn't the only person who likes to glue tech industry figures to the future when their contribution was largely historical or unrelated. For example, some die-hard FPS fans are still expecting ID Software's John Romero to top *Doom*, despite having proven on a few of occasions since that the likelihood is remarkably small.

As impressive as Shigeru Miyamoto's resume is, will he ever do anything as brilliant as *Super Mario Bros* and *Legend of Zelda* again? I doubt it. His inspired game design appears unable to wrestle Nintendo from the deep hole itself dug into.

What do all these people have in common, other than that they're very well known (at least in tech circles)? My view is that they were very specifically placed at a critical point in time, and that intersection caused them to become famous or notorious depending on your view.

However you move the pieces around, *Doom* couldn't have happened if the performance of PCs hadn't reached a critical threshold at the point it was written. And Google wouldn't have succeeded if people could have easily navigated the internet from the outset, however talented both Larry Page and Sergey Brin happen to be. Their success might have been the result of hard work or unique thinking, but without the right context, it would be unknown or a footnote in history.

Interestingly, it wasn't Trump's ill-informed statements that made me think about this, but the rather irritable whining sound coming from the father of *Star Wars*, George Lucas.

Much of it is directed at Disney and those behind the new film, like they care. He'd clearly established in his own head that they'd fail horribly without him, and when they didn't, it was all too much for him to take, it appears.

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THIS WEEK'S CROSSWORD

He's been doing the interview circuit to say how he doesn't like the film, and to make some very unfortunate statements

about a company from whom he was happy to accept and cash a \$4bn cheque for the rights.

Once can't deny that George made some significant contributions in the past, but that doesn't guarantee his involvement in perpetuity, whatever his ego might assume.

And irrespective of what copyright law might suggest, when something gets as all-pervading as *Star Wars*, Google or Windows, then we all own a little bit of that franchise through association.

Ironically, that's what Bill Gates mostly is these days – a shareholder. While he has the notional role of 'Technology Advisor' at Microsoft, he also owns about \$80bn worth of its stock. So unless Trump wants a campaign contribution, he'd better call someone else to find out where the off button for the internet resides.



Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 Potentiometer, 8 Stroll, 9 Impugn, 10 Ebonite, 12 Light, 14 Idyll, 16 Gigabit, 19 Stupor, 20 Parsifx, 22 Excommunicate.

Down: 1 Boot, 2 Zero In, 3 Utility, 4 Topic, 5 Delphi, 6 Feng Shui, 11 Body Text, 13 Timpani, 15 Lepton, 17 ASRock, 18 Prime, 21 Iota.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. This week was our first back at work after the new year. And what better way for us to start 2016 than by once again tackling the latest big news story. Well, one thing that caught our eye was about the Labour's cabinet reshuffle. Sadly, this was just something about politicians being sacked and had nothing to do with them dancing. Then, of

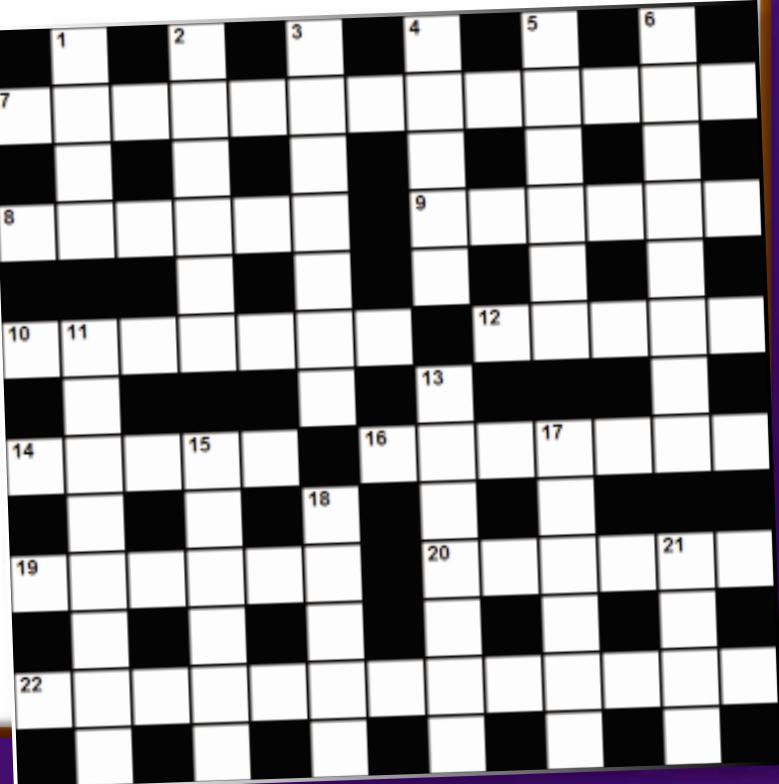
course, there was something about North Korea dropping an H-bomb, which sounded excited. But disappointingly, the H-bomb is some kind of weapon and has no relation to the F-bomb or what rappers might call 'da bomb' (if they're from 2003). Thankfully, there was at least one story of merit, involving a couple who won £35 million on the national lottery. Well, they would have had they actually checked that the ticket they bought using the National Lottery app had gone through. But it didn't, of course, and they were naturally a bit miffed. Now as much as we love a bit of schadenfreude, we have to say on this occasion, we just felt really, really bad for them. But who doesn't love a bit of human tragedy in their news?

Across

- 7 Productive relative to price. (4-9)
8 A remote procedure call protocol that uses XML to encode its calls and HTTP as a transport mechanism. (Abbr) (3-3)
9 The time when something ends. (6)
10 Ukrainian manufacturing and services company with particular expertise is in the field of building very large transport aircraft. (7)
12 The action or practice of lending money at unreasonably high rates of interest. (5)
14 Denotes a secure channel over an inherently insecure network. (5)
16 Take liberties or act with too much confidence. (7)
19 A colourless flammable gas used chiefly in welding and in organic synthesis. (6)
20 A British unit of capacity equal to nine imperial gallons. (6)
22 An increase in wavelength of X-rays or gamma rays that occurs when they are scattered. (7,6)

Down

- 1 A state of economic prosperity. (4)
2 Designating sound transmission from two sources through two channels. (6)
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In Next Week's Micro Mart*

- The most spectacular fails of 2015
- Which of the Microsoft Surface range is right for you?
- How to run Android apps on your PC
- Plus the usual mix of news, reviews and advice



* May be subject to change

Wireless Optical Combo 9060

Compact. Stylish. Precise.

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battery life



Thanks to its compact size, this set is the ideal addition for any laptop: The fully fledged keyboard (including numberpad) makes typing easy and convenient, especially over extended periods. The mouse with its 1000 DPI sensor delivers pin-point accuracy. What's more, Rapoo's latest energy saving technologies offer a battery life of up to 24 months.



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High resolution 1000 DPI sensor



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